the Cape to India, whilst Columbus, Amerigo Vespucci and John Cabot reached the continent of America. The story continues with the voyages of Dampier and Cook to Australia and the South Pacific Islands. In Africa we follow the travels of Mungo Park and Livingstone and finally reach our own times with the conquest of the North and South Poles. The whole book makes a stirring record of human endeavour.

EXPLORATION AND DISCOVERY

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PREFACE

THIS introduction to the subject of exploration and discovery aims not at encyclopaedic description but rather to interest the reader in major episodes in contrasted regions presenting contrasted problems. The book deals with the development of ideas and the technique of exploration and discovery, as related to geographical setting and changing historical background. Miss E. M. J. Campbell has kindly contributed an appendix outlining the history of navigation.

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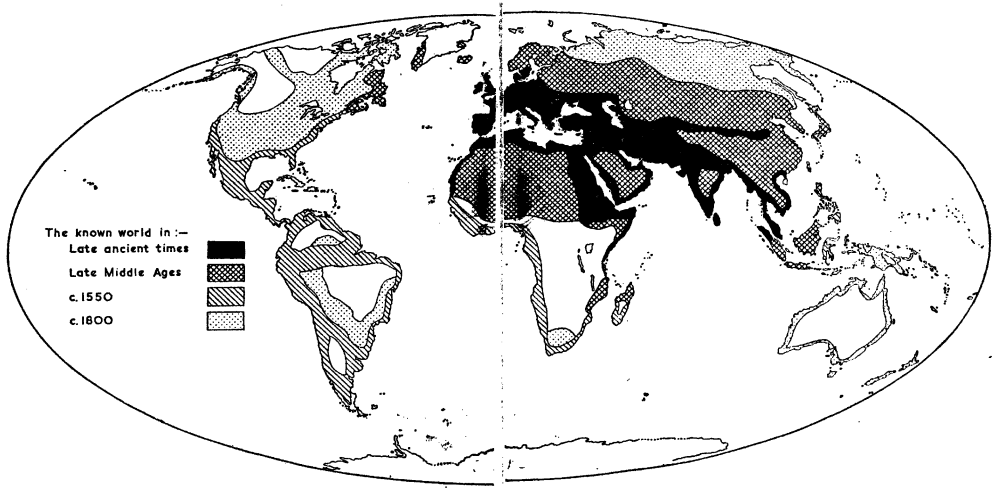
The known world in :—
Late ancient times
Late Middle Ages
c. 1550
c. 1800

INTRODUCTION

IT would seem appropriate by way of introduction to place the topics treated in this book in a general setting, to link the subjects of the essays in a comprehensive outline. Reference should first be made to Figure 1, which is designed to give the reader a general impression of the main stages by which western knowledge of the world was extended. The known world of the late Middle Ages shows advances over that of late Ancient Times, but it will be seen that by 1550 the events of the Great Age of Discovery had extended the outlook in unprecedented fashion. By the year 1800 further great changes had taken place; search for a northern passage to China and Japan had thrown light on the fringe of the Arctic by about 1630, but still more striking was the extended knowledge of the Pacific, mainly to be attributed to the search for a southern continent. After 1800 came the completion of the discovery of interior Africa, a great extension of knowledge of the polar regions, and a general increase in what may be called scientific travelling, as well as the achievement of detailed exploration in many parts of the world less accurately known long before.

The emphasis of this book is on modern times, but earlier developments are not ignored, since apart from their intrinsic interest they throw light on later history. Consideration of the views of Strabo and Ptolemy on the limits of the known world provides a selective basis for treatment of ancient exploration. Our second chapter is concerned with outstanding land travel in the Middle Ages, in particular with the knowledge of the Sudan revealed by the Moslem Ibn Battúta, and of eastern Asia revealed by Marco Polo. Other mediæval topics are

touched on by way of preamble to the consideration of the great enterprises described in later chapters; for example, Norse contacts with North America *c.* 1000 A.D. and the fifteenth-century quest for islands in the western ocean, have some relevance to the work of Columbus.

The Great Age of Maritime Discovery had its beginnings in the efforts of the Portuguese to push south along the west coast of north Africa. Precursors in the late Middle Ages there may have been, but the work inaugurated by Prince Henry was different in character, because not only was it persistent but it was also based on a newly created school of discovery; profiting by improved ships, and charts, and navigation, it also gave rise to them. One of the most significant events of all time was the passing of the dreaded Cape Bojador in 1434. The ultimate triumph of Vasco da Gama's entry into an Indian port in May 1498 may be considered as the inevitable outcome of the revelation of more and more African coastline, a revelation profitable in itself by virtue of traffic in slaves and gold.

The bolder westward sailing of Columbus in 1492 brought a New World to the ken of Europeans, but the Italian leader, a visionary, obstinate in his geographical ignorance, believed he had all but reached the lands described in glowing terms by Marco Polo. Most of his contemporaries knew better, and some quickly envisaged the need to sail farther west, to seek a passage through the new found lands, if the work of Columbus was to be completed.

Sebastian Cabot's quest for a western passage is considered as a sequel to the voyage of John Cabot, made from Bristol in 1497. The main outcome of the effort of Columbus to reach Cathay was rapid exploration of much of the American mainland and the acquisition of Aztec and Inca silver by Spaniards; while the outcome of the voyages of John Cabot was traffic in fish from the Newfoundland Banks. The English geographical renaissance, in fact, came belatedly, in the second half of the sixteenth century. It produced Richard Hakluyt the younger as historian of bold Elizabethan sailing, and in discovery the English became pioneers in the search for a northern passage to eastern Asia. The Dutch, too, vigorous competitors also of the Spanish and Portuguese, were active in seeking a route by

the north-east—the north-west route was almost exclusively the sphere of English enterprise.

The exploration of the Pacific Ocean began with the entry of Magellan's ships, through the strait named after him, in 1520. Magellan's voyage was an epic voyage, showing an unsuspected extent of ocean, showing the capacity of men to endure incredible hardships. Later, the southern continent of geographical theorists became an objective, and the southern Pacific the most favoured location. Spain and Holland were the interested Powers in the sixteenth and seventeenth centuries, de Quiros and Tasman the leading explorers. Not until late in the eighteenth century did vigorous searching take place, although William Dampier, an early exemplar of the scientific spirit of enquiry, was one of several who kept alive active interest in Pacific problems in the gap between the efforts of Tasman and the momentous voyages of James Cook in 1768–71 and 1772–75.

The voyages of Captain Cook were remarkable not only for the sustained efficiency of the leader and for their bearing on developments in the art of navigation, but because they took place at a time when scientific objectives were becoming stronger. Sir Joseph Banks, a great naturalist, accompanied Cook on his first voyage; he was influential in the promotion of African and polar exploration in the late eighteenth and early nineteenth centuries. With Cook on his second voyage went the Forsters, naturalists also, and the younger Forster provides a link with the subject of our conclusion. The great Humboldt acknowledged his debt to him. In a real sense the specialist enquiries of contemporary exploration are in the tradition of scientific investigation into geographical problems that received its greatest impetus from this versatile pioneer.

1

THE LIMITS OF THE ANCIENT WORLD

'When all is said,' writes J. Oliver Thomson in the introduction to his erudite work on ancient geography, 'the service of the ancients to discovery was not highly distinguished, though their known world was not a mere *orbis terrarum* round the Mediterranean lake.' He adds that their contribution to theory receives less attention but is far more important.[1] It is proposed here briefly to discuss ancient discovery, something of the limits of the ancient world, and something of geographical theory. How can this be done in short compass? Our solution is to consider the limits of the known world at its maximum extent, i.e., broadly in the second century of the Christian era and to do so mainly in the light of the evidence provided by Strabo and Ptolemy. We shall treat of episodes of discovery only in so far as they are relevant to our limited theme.

Strabo, a Greek (the Romans were but poor geographers) wrote, about A.D. 23, the most comprehensive work on geography that was produced in ancient times. He was no great traveller and his judgment was often at fault in accepting or rejecting material derived from other sources. He failed to make use of much useful material and he is often dull; but none the less, Strabo's *Geography*, designed for the instruction of rulers of men, is of the greatest interest. Unlike Ptolemy, who represents the school of thought that imagined *terra incognita* to stretch away beyond the bounds of the known in many directions, Strabo favoured the alternative view of a continuous oceanic margin. Both men believed that the 'oikoumene' or known inhabited world, was but part of the surface of a globe.

Strabo mentions Crates of Mallos, a Greek who made a

model globe, *c.* 150 B.C., in the following interesting passage:

'the man who would most closely approximate the truth by constructed figures must needs make for the earth a globe like that of Crates . . . and put down the map of the inhabited world. But since there is a need of a large globe, so that the section in question (being but a small fraction of the globe) may be large enough . . . let it be no less than ten feet in diameter.'

Should this be impracticable, he added, a map on a plane surface should be used, for 'it will make only a slight difference if we draw straight lines to represent circles.'[2] Given the inaccurate material available for the map maker of his time this statement was true.

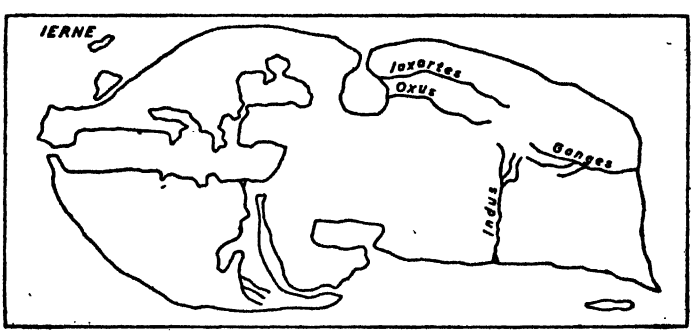

Fig. 1. Sketch to illustrate Strabo's ideas (after Bunbury)

In Strabo's view the inhabited world was contained within about one-third of the total circumference of the globe in the temperate zone; as to the space that intervened between the limit known to him in the east, India, and Iberia and Maurusia (Morocco) in the west, on the unknown side of the globe, he quoted the view of Eratosthenes (276–196 B.C.), that if the 'immensity of the Atlantic Sea did not prevent, we could sail from Iberia to India along one and the same parallel.' The southern limit to the inhabited world Strabo thought of as a zone of torrid heat, the northern as a zone of extreme cold—the latter ran to the north of Ireland (which he placed north

of Britain) but even so the Irish 'lead a miserable existence because of the cold.'

Homer, 'founder of the science of geography,' writes Strabo, 'declares that the inhabited world is washed on all sides by Oceanus, and this is true.' Strabo elaborated this theme:

'We may learn from the evidence of our senses, and from experience that the inhabited world is an island; for wherever it has been possible for man to reach the limits of the earth, sea has been found, and this sea we call "Oceanus." And wherever we have not been able to learn by the evidence of our senses, there reason points the way. For example, as to the eastern (Indian) side of the inhabited earth, and the western (Iberian and Maurusian) side, one may sail wholly around them and continue the voyage for a considerable distance along the northern and southern regions; and as for the rest of the distance around the inhabited earth which has not been visited by us up to the present time (because of the fact that the navigators who sailed in opposite directions towards each other never met) it is not of very great extent, if we reckon from the parallel distances that have been traversed by us. It is unlikely that the Atlantic Ocean is divided into two seas, thus being separated by isthmuses so narrow and that prevent the circumnavigation; it is more likely that it is one confluent and continuous sea. For those who undertook circumnavigation, and turned back without having achieved their purpose, say that they were made to turn back, not because of any continent that stood in their way and hindered their further advance, inasmuch as the sea continued open as before, but because of their destitution and loneliness. This theory accords better too, with the behaviour of the ocean, that is, in respect of the ebb and flow of the tides; everywhere, at all events, the same principle, or else one that does not vary much, accounts for the changes both of high and low tide, as would be the case if their movements were produced by one sea and were the result of one cause. Hipparchus is not convincing when he contradicts this view on the ground, first, that the ocean does not behave uniformly throughout, and, secondly, that, even if this be granted, it does not follow that the Atlantic Ocean runs round the earth in one unbroken circle. . . .'

How far does Strabo refer to actual exploration in support of his thesis? In one passage we have a reference to the partial

exploration of the southern Caspian region, Hyrcania, which actually took place *c.* 285 B.C. In the course of this Patrocles was misled by indirect reports—'it is not generally agreed that persons have sailed from India to Hyrcania but Patrocles states that it is possible.' Strabo knew of no one who had sailed along the north coast of Europe into the Caspian Sea! As to circumnavigation of Africa (Libya), attempts had been made from the Red Sea and from the Straits of Gibraltar (Pillars of Heracles):

'all those who have made coasting voyages on the ocean along the shores of Libya, whether they started from the Red Sea or from the Pillars of Heracles, always turned back after they had advanced a certain distance, because they were hindered by many perplexing circumstances, and consequently they left in the minds of most people the conviction that the intervening space was blocked by an isthmus; and yet the whole Atlantic Ocean is one unbroken body of water.'

Strabo's account of the failure of attempts made by the Greek, Eudoxus, some time between 117 and 108 B.C., to sail direct from Gades (Cadiz) to India, accords with this view. It should, however, be noted that there are those who believe that Africa was in fact circumnavigated in ancient times, despite the obvious ignorance of both Strabo and Ptolemy about any such achievement. The evidence is slender in the extreme; a brief account derived from the Phoenicians (who were very prone to propagate false stories) and dating from about one hundred and fifty years after the alleged event. It is Herodotus (*c.* 440 B.C.) who tells us that

'Libya shows itself to be surrounded by water, except so much of it as borders on Asia. Necho, king of Egypt, was the first whom we know of that proved this; he, when he had ceased digging the canal leading from the Nile to the Arabian Gulf, sent certain Phoenicians in ships, with orders to sail back through the Pillars of Heracles into the Northern Sea, and so return to Egypt. The Phoenicians accordingly, setting out from the Red Sea, navigated the Southern Sea; when autumn came, they went ashore, and sowed the land, by whatever part of Libya they happened to be sailing, and waited for harvest; then, having reaped the corn, they

put to sea again. When two years had thus passed, in the third, having doubled the Pillars of Heracles, they arrived in Egypt, and related what to me does not seem credible, but may to others, that as they sailed round Libya, they had the sun on their right hand. Thus was Libya first known.'[3]

Ptolemy, (Claudius Ptolemaeus A.D. 90–168?) lived in Alexandria and his main interest was in astronomy. His *Geography* dating from *c.* A.D. 150 is none the less of great interest and importance, not only as the culmination of ancient aspirations in the direction of map making, but because it had profound influence in the late fifteenth century, in Europe—and much earlier in the Arab world. His eight books are not meant to be read and are quite different in purpose from the writing of Strabo. His lists of places, tribes, rivers, mountains —each giving a position in terms of latitude and longitude, enable the maps to be made by anyone at any time; the variation that would result as between individual efforts would be slight. There are some 8,000 locations, and the Ptolemy maps include one for the known world and 26 sectional or provincial maps; just when the surviving copies were made, and the difficult problem of deciding on how far some of the materials in the books has suffered corruption from the errors of copyists,

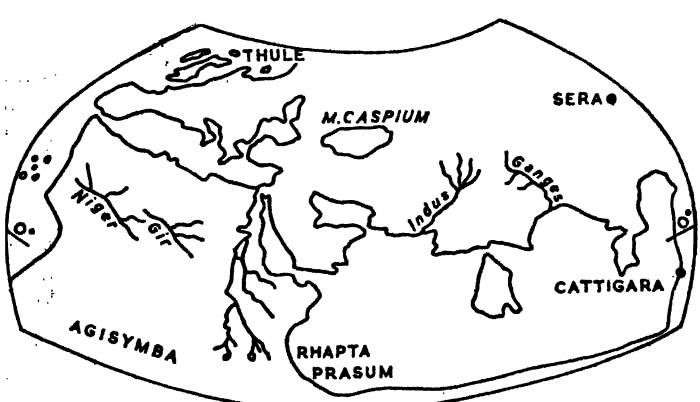

Fig. 2. Outline of the World according to Ptolemy.

these are questions for the students of the history of cartography. Certainly Ptolemy has succeeded in transmitting his ideas to posterity.[4]

The positions given by Ptolemy are in astronomical terms, but it must be pointed out at once that with the exception of a few latitudinal positions, such as those of Massilia, the Straits of Gibraltar, Alexandria, Rhodes and Rome, the basis of calculation was an estimate of distance based on travelling time; latitudes are less inaccurate than longitudes—indeed it was not until the eighteenth century that practical measurement of longitude became possible for seamen and travellers in general. Ptolemy was aware of the limitations of his maps; he quotes Marinus of Tyre (A.D. 70–130), whose work he was setting out to correct, to the effect that few merchants are interested in exploration, and when they talk of distances are prone to exaggerate boastfully. Later users of his material were often curiously lacking in caution.

Ptolemy thought the globe to be smaller than it was—he adopted, not the relatively accurate estimate of its circumference made by Eratosthenes, but the poorer computation made by Posidonius—and the known world of his day to be larger than the reality, particularly in east-west, longitudinal extent. He reduced Marinus' 87 degrees of latitude to 80, and his 225 degrees of longitude to 180. This left the north-south extent of known Africa, in particular, exaggerated, and the east-west extent of Asia grossly so. Striking is the manner in which for Ptolemy unknown land extends to the very margins of his map in northern and eastern Asia and to the south in Africa. He even depicts a land bridge between Asia and Africa, enclosing the Indian Ocean on the south. The differences between the map that can be reconstructed to show Strabo's views of the 'world,' and the Ptolemaic map, partly reflect additions to knowledge made in the interim, partly alternative interpretations of hearsay picked up in remote places.

In the extreme north of Europe, to the north of Scotland, in 63° N., Ptolemy places the island of Thule, and on the mainland of Eurasia, in about the same latitude, the Hyperborean Mountains, from which flow the headstreams of the Volga (Rha). The Hyperboreans, dwelling beyond the north wind,

peaceful, happy people, had been vaguely placed towards the north for a long time by the Greeks. The Alexandrian clearly knew little of what he calls 'Sarmatia,' the region east of the Vistula, and north of the relatively well-known steppe region bounded on the south by the Black Sea (Euxine).

In the Venedic Gulf (Sinus Venedicus), i.e., the Baltic Sea, he places the island Scandia, apparently a reference to part of south Sweden, heard of by traders in amber, product of the west Baltic coastlands from dim antiquity. Greek and Roman knowledge of the amber region had long been based on indirect sources; but about a century before Ptolemy's time 'an unknown knight' made what Cary regards as 'the most extensive of all expeditions by Roman civilians,' when he went from Carnuntum, near the site of modern Vienna, to the amber coast.[5] But we must return to mysterious Thule, which though on the fringe of the world for Ptolemy, had first been spoken of by the Greek seaman Pytheas, who sailed north in the Atlantic *c.* 320 B.C.

For Ptolemy, Thule seems to have been one of the Shetland Isles, although their latitude is 60°–61° N. What was the Thule that Pytheas heard about? First let us note that this Greek from Massilia (the ancient forerunner of Marseilles and a Greek colony in the western Mediterranean) made observations of the length of day and of the altitude of the sun—'for once it seems that an ancient journey may be ascribed, as many admit, purely or mainly to scientific curiosity,' though Thomson adds that 'nothing is really known, however, of the circumstances' and further, 'it is often guessed that he had the backing of his city, anxious for better touch with the source of tin.' Much obscurity surrounds the exploit because, of his report, 'we have only scraps, chiefly from two writers [Polybius and Strabo] who lose their tempers whenever they quote such an arrant liar.'

Of comments made by Pytheas on Britain, comments which may in fact include later elements, the gist of some that relate to the north and may include Thule is as follows:

'they thresh their corn indoors in large barns, as the climate is dull and wet; they make bread, and those who have both corn and honey brew a drink from them; northwards nearer the frozen zone

animals become scarce or fail, and so do cereals except millet (oats?), though there are wild fruits, vegetables and roots.'

It is to those who accept these comments as in fact relating to Thule that Norway becomes a possible identification—but this is not the complete story; to quote Thomson further, according to his critics, Pytheas

'heard that it is the northmost of the British Isles, six days north of Britain, and near or only one day from the "frozen" sea, if it was not conceived rather as the "curdled" sea; in these parts there is something—he had seen it himself from a distance—neither land nor sea nor air but a blend of them, like a sea-lung, in which land and sea and everything floats, and which is in some sort of bond holding all things together, something impassable for men or ships (the wording is very mysterious); there is habitable land up to "the utmost parts about Thule," where "the summer tropic is the same as the arctic circle." . . .'

For further analysis of a recalcitrant problem we refer the reader to the text from which we have quoted; the sea-lung in particular 'has given desperate trouble.' Of the possibilities hearsay of Iceland would seem to be plausible as the basis of the original Thule story, but few would take Pytheas all the way to Iceland, as Stefansson would have us do.

In northern Asia Ptolemy shows on his map a vast Scythia, extending north of the great generalised east-west mountain ranges, that stretch from Asia Minor to Serica, the Paropanisus —Caucasus–Imaus–Emodus Mons. Serica was for him the most remote of Asiatic lands in touch by trade with the world of Rome; it was a land where silk came from the land of the Seres, with its capital at Sera, a city which Ptolemy shows as being nearly 180° east of the other extreme of his known world, the Fortunate Islands or Canaries. Serica is probably north China, though the Seres included also people farther west, who were intermediaries in traffic.

The map maker followed Marinus in using information derived from the Syrian merchant, Maes; traders employed by the latter used the route that led from Bactra (Balkh) by mountain pass and desert trail to a meeting place somewhere east of the Pamirs, i.e., the Stone Tower. Just where this is to

be placed, and whether the agents went farther is doubtful—as also is the identification of Sera with Si-an. But Marinus was told of seven months' journey from the Tower to Sera, and assumed a continuous effort in a due easterly direction. Ptolemy in his arbitrary fashion brought Sera west from the 228° of Marinus, to 177° east of the Fortunatae, halving Marinus' estimate of the distance. Thus did the map makers produce their longitudes; but behind the guesswork lies the remarkable fact that luxuries for prosperous Rome could cause a narrow avenue of known territory to be opened up east from the Oxus basin. A contributory factor was the extension of Chinese control west to the Tarim basin, at least at times.

Ptolemy gained no inkling of a China sea coast in the direction of Serica from his land traders. The coast of the Sinae, who would seem to be none other than the Seres, but heard of by mariners, he places far away to the south, and facing west; the port is Cattigara, the capital Thinae. Alexander is apparently the source, but in Thomson's words, 'for these farthest parts it is not clear either what the seaman Alexander said or how the two geographers used him.' Is Thinae another version of Si-an? Is it Lo-yang? Or Nanking? What of Cattigara? Is it Canton? Hanoi? Saigon? An ancient Singapore? No final answer is possible.

We know, however, that 'in October, A.D. 166 the supreme achievement of western travel in the Far East befell,' when a commercial mission came to the emperor Huan-ti from Marcus Aurelius; and 'from that time, so the annals go on to say, dated direct intercourse between the Roman Empire and China.'[6] This was, however, short-lived; direct maritime trade declined after the second century A.D.—it was the land route to Sera that was used later, in fact for some four hundred years; partly because after Constantinople became the capital of the Roman Empire, in A.D. 330, there was still demand for silk in this quarter.

We have already noted that so far as the distribution of land and sea is concerned Ptolemy's map makes possible a land journey from Cattigara to east Africa. Oddly enough he thinks the last people to be encountered before entering terra incognita south of Cattigara, would be the 'fish-eating Ethiopians,'

placed a long way indeed from the 'Ethiopian cannibals' north of Cape Prasum, at the other extremity of the unknown land. Cape Prasum is often interpreted as the modern Cape Delgado in about 10° S. Marinus and Ptolemy knew that Dioscorus had sailed thus far, and that Diogenes had sailed to Cape Rhaptum —in fact, the east African coast, south to the Zanzibar of later times, i.e., to Rhapta, was frequented by Greek traders at this time, although Arabs it is true were dominant in a trade that was based on ivory and tortoise shell.

What are we to look for on the west coast of Africa, as depicted by Ptolemy? Caution is needed because the latitude values are clearly wrong. The Fortunate Islands, in about 28° N. he places, in rather a dispersed fashion, between about 12° and 15° N.—the important fact is that he knows little south of the latitude of these islands, south of the steppe lands that border the Sahara on the north. In fact the only voyage that is known to have been made far to the south on this coast—or at least is thought to have been made, in the opinion of most of those who have studied the evidence—is the colonising mission of the Carthaginian, Hanno, *c.* 490 B.C. If Hanno's ships reached West Africa, they had no successors.

In continental Africa, west of the Nile, the evidence of the Ptolemaic map would seem to show little advance on knowledge gained in earlier times. The Sahara desert was a most effective barrier, and although it is difficult to believe that no word came through of the region of summer rains and savannah to the south, of the Sudan, and of the east-flowing Niger, it seems certain that actual contact with it was rarely made. Ptolemy has a 'Gir' and a 'Nigir,' but these words are akin to terms which still mean water in Tuareg, and not necessarily any specific watercourse—in fact, it is highly probable that Ptolemy's streams are seasonal watercourses south of the Atlas mountains, in so far as they have any basis in reality.

What of Agisymba? Herodotus heard a story of some Nasamones (Berbers), oasis dwellers, who crossed the desert and ultimately reached a city with black inhabitants, and 'a great river running from the west to the east.' Did Julius Meternus also reach the Sudan? Is the Lake Chad area to be identified with Agisymba, 'the country of the Ethiopians where the

rhinosceros is to be found'? Marinus says it was reached by Meternus 'setting out from Leptis Magna and Garama (Jerma) with the king of the Garamantes (of Fezzan)'; they, by 'bearing continuously southward came within four months to Agisymba.' Some would not go so far as identifying this alluring place with Chad—perhaps it may correspond to the oasis of either Air or Tibesti.

Ptolemy comes nearer to the truth in his delineation of the Nile system than any other ancient geographer. The Greeks had long been curious about this remarkable river, which brings water to the Egyptian oasis, below Syene and floods in summer, since in the Mediterranean region winter is the rainy season in most areas and in summer rivers run low. Obscurity long surrounded the Nile to the south of Egypt because of the great length of the river, the cataracts that impeded navigation, the great bend in the river between the first and the fifth cataracts, and the wide desert that lies between Egypt and the Sudan. The latter region, like mountainous Abyssinia, was most easily reached from the Red Sea coast.

Herodotus stated that 'no one is able to speak about the sources of the Nile, because Libya, through which it flows, is uninhabited and desolate,' but Strabo, largely basing his account on that of Eratosthenes, was able to give some description as far south as the Sudan and Abyssinia. Moreover, while Herodotus could argue that the summer floods were due to the fact that during winter 'the sun, being driven by storms from his former course, retires to the upper part of Libya' and 'dries up the native river streams,' Strabo knew better. He wrote 'the ancients depended mostly on conjecture, but men of later time, having become eyewitnesses, perceived that the Nile was filled by summer rains, when upper Aethiopia was flooded, and particularly in the region of its farthermost mountains. . . .'

Ptolemy provides a climax by locating the snow-fed sources of the upper river in the 'Mountains of the Moon,' a lofty east-west trending range; streams fed by snow-melt ran north to two large lakes, from each of which flowed two large streams that united to form the Nile. His mountains and lakes may be a schematic representation of the drainage pattern of the east African plateau. Did Ptolemy make a fortunate guess? He

seems to have been guided by the information secured by the Greek, Diogenes, who visited the east African coast, and either went into the interior or shrewdly interrogated those who knew something of its physical features.

The assessment of the Romans as poor geographers is of only recent origin. There were two authors, Mela and Pliny, who wrote in Latin, in the period between Strabo and Ptolemy, and whose work enjoyed great popularity for many centuries—Solinus, of the third century, ever popular in the Middle Ages, drew heavily from both. Even after Ptolemy's work became available in Latin early in the fifteenth century the Roman authors still wielded influence—as authorities to such men as Hakluyt, Mercator and Ortelius in the following century. They were, in fact, uncritical compilers with a leaning towards the fabulous and the sensational. The short work of Pomponius Mela, written in A.D. 43, deals with such phenomena as Griffins and Amazons, while the elder Pliny (A.D. 23–79), was the author of a vast encyclopaedia, in which, writes Thomson, 'the four books on geography are even queerer than the rest.' Strabo may seem unduly credulous at times, but his judgment is sober compared with that of Pliny, who states categorically, for example, that both Hanno and Eudoxus circumnavigated Africa. Pliny and Mela have a quaint story about some 'Indians' who arrived on the coast of Germany, having been driven by storms past the 'Caspian Gulf'; it came from Cornelius Nepos (57 B.C.). We find Humphrey Gilbert using it as one of his arguments for the existence of a north-west passage, in his famous *Discourse*!

[1] See the introduction to J. Oliver Thomson's *History of Ancient Geography, Cambridge*, 1948. Quotations by permission of Cambridge University Press.

[2] Our quotations are from *The Geography of Strabo*, translated by H. L. Jones, Loeb edition in 8 volumes, London, 1917-32. (Courtesy of W. Heinemann, Ltd.).

[3] Quotations from the Bohn edition of *Herodotus*, London, 1854.

[4] See the introduction by Joseph Fischer to the *Geography of Claudius Ptolemy*, translated by E. L. Stevenson. New York, 1932. In this work maps are reproduced from an edition of *c.* 1460, and the text is based upon the 'generally recognised best Latin and Greek texts' of the late fifteenth and early sixteenth centuries.

[5] M. Cary and E. H. Warmington, *The Ancient Explorers*, London, 1929.

[6] Ibid.

2

THE MIDDLE AGES: IBN BATTÚTA AND MARCO POLO

Our consideration of exploration in the Middle Ages proceeds on lines that differ from those pursued in the last chapter. The two main topics are the Arab advance in Africa, and more especially the travels of Ibn Battúta in that continent, and European travel in Asia with particular reference to Marco Polo. Something will be said elsewhere of the exploits of the Norsemen, which were apart from the main currents of European life and thought, and also of the forerunners of the Portuguese in Atlantic waters.

The writings of Ibn Battúta were not, like those of Marco Polo, to influence men of action in the Great Age of Discovery: they did not, in fact, become widely known until the nineteenth century. None the less, a translation of a selection of them is available in edited form, and they have interest as giving an early view of the Sudan and of the Sahara. The *Travels of Marco Polo* are, of course, great literature, and they have enjoyed great popularity; several versions are extant. It is true that in the late Middle Ages the *Travels of Sir John Mandeville* (*c.* 1370) were popular, too, but their author was more remarkable for literary talent than for his travels; he was, in fact, one of the great imposters of history. From the Latin works of the schoolmen we glean little; they looked back to old sources for their geography, not at the expanding horizons of their time. They largely ignored travellers and were, in turn, ignored by them. There is no mediæval Strabo and no mediæval Ptolemy.

As a result of rapid expansion of the Moslem 'world' soon

after the death of the prophet in A.D. 652, it came to extend from Iberia and Africa to China and the East Indies. Opportunities and facilities for travel in the course of pilgrimage and trade were abundant. The most striking gain was mastery of Saharan travel—on African coasts there was advance only in the east.

The Arabs, like the ancients, knew more of east, than of west African coasts. Contacts with the Atlantic coast of north Africa were slight. According to Al Masudi (tenth century), the 'Western Ocean' was a realm of danger and darkness and could not be navigated. It has been suggested that Edrisi (thirteenth century), shows 'faint glimmerings of knowledge about the Senegalese coast,'[1] but if they are genuine they are faint indeed, and Abul Fida's concept (fourteenth century), of the 'Environing Sea' as stretching from Morocco, south to the Equator, thence eastward, would seem to be theoretical.

On the east coast Arab knowledge extended as far south as Sofala in about 20° S., but the limit for most, according to Albiruni, great traveller of the eleventh century, was Zanzibar. Beyond, waters were ever in motion and danger lurked. Interestingly enough, Marco Polo seems to have heard of this belief some two hundred years later. After a description of Madagascar we have the statement that 'ships cannot sail further south to other islands, but only as far as this island and that of Zanghibar, for the sea-current there flows so violently southwards that they could only return with the greatest difficulty.' There is no indication that Arab geographers followed Ptolemy in thinking of an Indian Ocean land-locked on the south.

Ibn Battúta (1304–68) was a theologian, a native of Tangier, who travelled extensively from the age of twenty-one years until his death. 'He was in fact the only mediæval traveller who is known to have visited the lands of every Mohammadan ruler of his time, quite apart from such infidel countries as Constantinople, Ceylon and China. . . .'[2] The account of his travels was written by Ibn Juzayy, who made additions and added embellishments to the narrative as dictated to him. Before considering his celebrated account of a journey to the 'Negrolands' of the Sudan, it should be noticed that some of

his comments on other African areas are of geographical interest—for example, on the rainfall régime of Abyssinia:

'A strange thing about the rain in India, Yemen, and Abyssinia is that it falls only in hot weather, and mostly every afternoon during that season, so travellers always haste about noon to avoid being caught by the rain, and the townsfolk retire indoors. . . .'

The Nile is described as remarkable in a passage that illustrates the scope of Arab geography:

'The Egyptian Nile surpasses all rivers of the earth in sweetness of taste, length of course, and utility. No other river in the world can show such a continuous series of towns and villages along its banks, or a basin so intensely cultivated. Its course is from south to north, contrary to all other great rivers. One extraordinary thing about it is that it begins to rise in the extreme hot weather, at the time when rivers generally diminish and dry up, and begins to subside just when rivers begin to increase and overflow. The river Indus resembles it in this feature. The Nile is one of the five great rivers of the world, which are the Nile, Euphrates, Tigris, Syr Darya and Amu Darya; five other rivers resemble these, the Indus . . . the river of India which is called Gang [Ganges]—it is to it that the Hindus go on pilgrimage, and when they burn their dead they throw the ashes into it, and they say that it comes from Paradise—the river Jun . . . in India, the river Itil [Volga] in the Qipchaq steppes . . . and the river Saru [Hwang-ho] in the land of Cathay. . . .'

One of the most striking results of Moslem domination of continental north Africa was the development of trans-Saharan traffic. Ghana, a focus of traffic in the Sudan which has never been placed on the modern map, acknowledged Moslem suzerainty in 1076, and by the twelfth century trans-Saharan intercourse was well established. Leading items in trade were gold and slaves from the Negrolands and salt from the Sahara. In Battúta's time Iwálátan, about 200 miles to the west of Timbuktu, had come to supersede Ghana as a great market; Battúta passed through it on his way to Málli, capital of a negro empire which, with fluctuating fortunes, lasted from the thirteenth to the seventeenth century. Setting out from Fez he

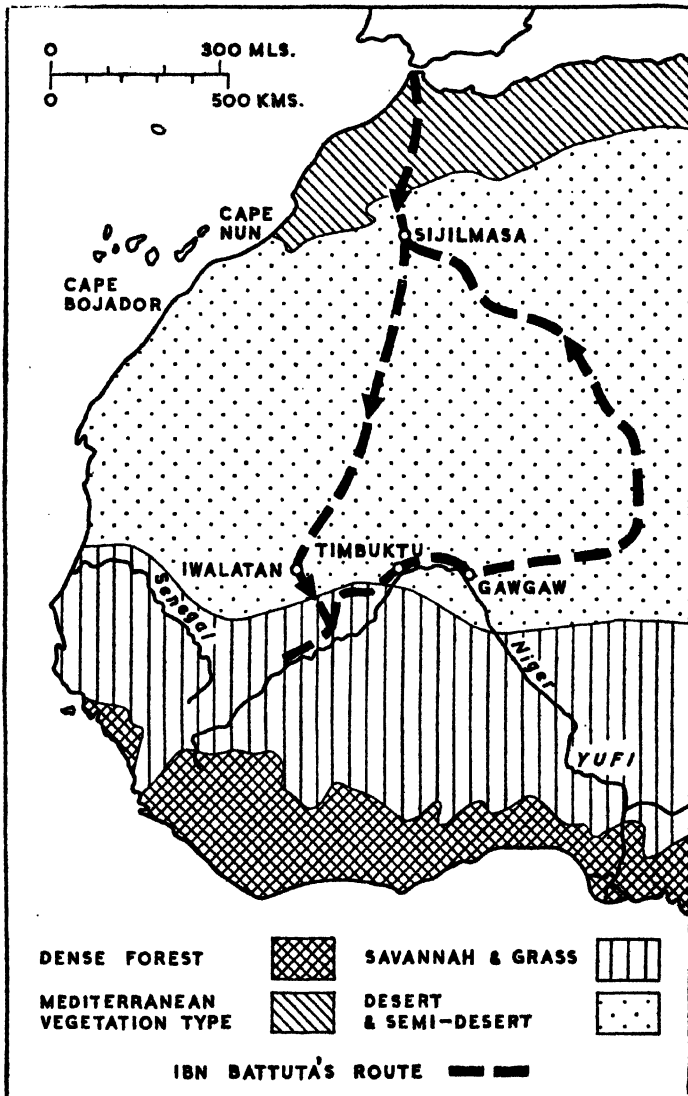

Fig. 3. Battúta's Journey to the Sudan

proceeded south to Sijilmása, a settlement now in ruins, south of the Atlas mountains, near Tafilelt.

Having bought camels and forage to last for four months, Battúta left Sijilmása on February 18th, 1352, in a caravan proceeding to Taghaza, in the central Sahara; the journey took twenty-five days and Taghaza was found to be

'an unattractive village, with the curious feature that its houses and mosques are built of blocks of salt, roofed with camel skins. There are no trees there, nothing but sand. In the sand is a salt mine; they dig for the salt, and find it in thick slabs, lying one on top of the other. . . . A camel will carry two of these slabs. No one lives at Taghaza except for the slaves of the Massúfa tribe, who dig for the salt; they subsist on dates imported from Dar'a and Sijilmása, camel's flesh, and millet imported from the Negrolands. The negroes come up from their country and take away the salt from there. . . . The negroes use salt as a medium of exchange . . . they cut it into pieces and buy and sell with it. . . . Water supplies are laid in at Taghaza for the crossing of the desert which lies beyond it, which is a ten-nights' journey with no water on the way except on rare occasions.'

From the next halting place, Tásarahlá, it was customary, we are told, to despatch a scout (takshif) to go ahead to Iwálátan, with letters to friends, so that lodgings could be hired and the caravan be met, four nights' journey out of the town—with water; but

'It often happens that the takshif perishes in this desert, with the result that the people of Iwálátan know nothing about the caravan, and all or most of those who are with it perish. That desert is haunted by demons; if the takshif be alone, they make sport of him and disorder his mind, so that he loses his way and perishes. For there is no visible track or road in these parts—nothing but sand blown hither and thither by the wind. You see hills of sand in one place, and afterwards you will see them moved to quite another place. . . .'

Battúta's caravan reached Iwálátan two months after leaving Sijilmása. The town is described as

'an excessively hot place, and boasts a few small date-palms, in the shade of which they sow water melons. Its water comes from

underground . . . and there is plenty of mutton to be had. The garments of its inhabitants . . . are of fine Egyptian fabrics . . . these people are Muslims punctilious in observing the hours of prayer, studying books of law, and memorising the Koran.'

After a sojourn of fifty days came the journey to Málli, 'reached in twenty-four days from Iwálátan if the traveller pushes on rapidly.' The position of Málli is uncertain but it may correspond, according to one view, to Nyani in 11° 22′ N., 08° 18′ W. The road is described as safe; and baobab trees as providing welcome shade and sometimes water, collected in the hollow trunk, 'so that they serve as wells.' Food was easily obtained—millet, milk, chickens, rice, etc.—in return for such things as salt or beads. The Niger, referred to as the 'Nile,' was reached at Kárasakhú. Battúta's views as to the course of that river resemble those of Herodotus, if indeed the Nasamones reached the Niger at all; it is described as eventually joining the Nile that flows north through Egypt.

Battúta arrived at Málli on June 28th, 1352, and left on February 27th in the next year, but for two months after his arrival he was ill as a result of eating a native dish. He assessed the vices and virtues of the negroes, and described the miserly Sultan Sulaymán, and the festivals. On his return journey he comes across the hippopotamus disporting in the 'Nile'—

'We came to a wide channel which flows out of the Nile and can only be crossed in boats. The place is infested with mosquitoes, and no one can pass that way except by night. We reached the channel three or four hours after nightfall on a moonlight night. On reaching it I saw sixteen beasts with enormous bodies, and marvelled at them, taking them to be elephants, of which there are many in that country. Afterwards I saw that they had gone into the river, so I said to Abu Bakr "What kind of animals are these?" He replied, "They are hippopotami which have come out to pasture ashore."'

Later, the theologian traversed the four miles that separated Timbuktu from the river, and sailed to Gao and from Gao Battúta set out in an easterly direction for Tagadda, with a caravan of merchants, thence north through the Haggar country, and so back to Sijilmása.

Evidence of any direct contact of Christians with the negro realm beyond the Sahara is very slight. Some indirect knowledge reached Christendom, mainly from frequenters of north African ports. The traffic in gold was particularly alluring, and 'Wangara' became associated with it; this was a region vaguely placed to the south of the Sahara. Actually, Battúta makes a reference to negro traders called 'wanjarata,' who resided in a large village ten days' journey from Iwálátan, and it would seem that in fact 'Wangara' was originally the name of a people later called Mandigo or Mande; yet, as we shall see, when the Niger problem engaged much attention in Mungo Park's time, 'Wangara' was thought of as a swamp region inland, in which the great river terminated. Edrisi had described it as eight days' journey from Ghana and as an island surrounded by the 'Nile' on all sides, apparently therefore above Timbuktu.

Marco Polo was the leading figure in a period of travel which lasted approximately for a century, from about 1250 to 1350. The crusades, and the mercantile enterprise of Mediterranean trading cities, had shown that Europe was awakening, but it was in this period that the geographical horizon was greatly enlarged; this was made possible by the widespread conquests of the Tartars or Mongols.

A measure of political stability became characteristic of a vast region that extended from the Black to the China Seas, across the whole of central Asia, and included Syria and Persia. A number of lesser khans to a varying degree acknowledged the authority of the Great Khan, and on the whole foreigners were tolerated. At first terror had spread through Europe when assaults were made on its borders in 1222–23 and in 1241, but the menacing tide receded, and the idea gained ground that the Tartars might become allies in the struggle against the Moslems. Perhaps also the mighty Prester John, a legendary Christian potentate, might be found and become a good friend to Christendom; was he not descended from the race of the Three Wise Men?

Thus it is not surprising that two pioneer travellers into Asia were an emissary from Pope Innocent IV, the Italian John of Pian de Carpini, who travelled in the years 1245–47, and a representative of the King of France, the Flemish

William of Rubruck, who travelled in the years 1251–54. Both wrote accounts of their journeys to and from the court of the Grand Khan, near Karakorum, in Mongolia.

Beazley describes Carpini's narrative as 'a masterpiece of clear and accurate description,' his account of the Tartars and their ways as 'the best Latin treatment of the subject in the Middle Ages.'[3] Hakluyt printed extracts from it in his collection of *Voyages*, as concerning the 'Northeast parts of the world'—his version comes from the *Speculum Historiale*, of Vincent of Beauvais. 'Of the situation and qualitie of the Tartars land' we read:

'There is towards the East a land which is called Mongol or Tartaria, lying in that part of the worlde which is thought to be most North Easterly . . . on the north side it is environed with the Ocean Sea. In some part thereof it is full of mountaines, and in other places plaine and smoothe grounde, but everie where sandie and barren, neither in the hundredth part thereof fruitefull. For it cannot beare fruite unless it be moistened with river waters, which bee varie rare in that countrey. Whereupon they have neither villages nor cities among them, except one which is called Cracurim, and is said to be a proper towne. We our selves saw not this towne but were almost within halfe a dayes journey there of when we remained at Syra Orda, which is the great court of their Emperour. And albeit the foresaid lande is otherwise unfruitful, yet it is very commodious for the bringing up of cattell. In certaine places thereof are some small store of trees growing, but otherwise it is almost destitute of woods. Therefore the Emperour, and his noble men and all other warme themselves, and dresse their meate with fires made of the doung of oxen, and horses. The ayre also in that countrey is verie intemperate. For in the midst of Sommer there be great thunders and lightnings, by the which many men are slaine, and at the same time there falleth great abundance of snowe. There bee also such mightie tempestes of colde windes, that sometimes men are not able to sitte on horsebacke. Whereupon, being neere unto the Orda (for by this name they call the habitations of their Emperours and noble men) in regarde of the great winde we were constrained to lye groveling on the earth, and could not see by reason of the dust. There is never any raine in Winter, but onely in Sommer, albeit in so little quantitie, that sometimes it scarcely sufficeth to allay the dust, or to moysten the rootes of the grasse. . . .'

Under the heading of 'forme, habite, and maner of living' we find the following interesting passage:

'Their habitations bee rounde and cunningly made with wickers and staves in manner of a tent. But in the middest of the toppes thereof they have a window open to convey the light in and the smoake out. For their fire is always in the middest. Their walls bee covered with felt. Their doores are made of felte also. Some of these Tabernacles may quickely be taken asunder, and set together again, and are carried upon beastes backes. Other some cannot be taken insunder, but are stowed upon cartes. And whithersoever they goe, be it either to warre, or to any other place, they transport their tabernacles with them. They are very rich in cattell, as in camels, oxen, sheep and goats. And I thinke they have more horses and mares than all the world besides. . . . They drinke milke in great quantitie but especially mares milke, if they have it.'

Not all that Carpini wrote has the stamp of accurate description; in common with others of his time, he reports hearsay stories of fabulous beings. Such are the men 'destitute of joynts in their legges, so that if they fall, they cannot rise alone by themselves' and the 'monsters resembling women,' whose male offspring were 'like unto dogges,' the existence of the latter being affirmed by 'certaine clergie men of Russia.' Rubruck (Rubruquis) reported many details that show a measure of detached observation, and unlike most travellers of this period even shows acquaintance with the writings of the schoolmen on geographical matters. When he corrects Isidore of Seville, an early seventh-century writer who was still influential, Rubruck, as quoted by Hakluyt, wrote of the 'Hircan' or Caspian Sea,

'This Sea therefore is compassed in on three sides with the mountaines, but on the North side with plaine ground. Friar Andrew on his journey traveled round about two sides thereof, namely on the South and on the East sides: and I myselfe about other two, that is to say, the Northe side in going from Baatu to Mangu-Can, and in returning likewise: and the West side in comming home from Baatu unto Syria. A man may travel rounde about it in foure moneths. And it is not true which Isidore

reporteth, namely that this Sea is a bay or gulfe comming forth of the Ocean: for it doeth, in no part thereof, joyne with the Ocean, but is environed on all sides with lande.'

Rubruck refers also to the 'Seres' of the ancients:

'Beyond Muc is great Cathaya, the inhabitants whereof (as I suppose) were of olde time, called Seres. For from them are brought most excellent stuffes of silke. And this people is called Seres of a certaine towne in the same countrey. I was crediblie informed, that in the said countrey, there is one towne having walles of silver and bulwarkes or towers of golde. . . .'

The travels of Marco Polo were the outcome of earlier journeys made by his father, Niccolo, and his uncle Matteo, in company. They were Venetian jewel merchants, who set out from Constantinople in 1260 and travelled via Soldaia in the Crimea, to sell their wares at the court of 'Barca Khan, Lord of a part of the Tartars, who resided at that time at Bolgana and Sarai.'[4] The way back being barred by warfare, they travelled on from the Volga to Bokhara, and some three years later were persuaded to join an embassy proceeding to the 'Lord of all the Tartars,' namely Cublai, who lived at the extremity of the earth between east and north-east.

The journey lasted a year, but their reception at Cambaluc (Peking) was friendly, and *en route* they 'met with great marvels and many novelties.' Cublai Khan questioned them about 'the Lord Pope and all the affairs of the Roman Church, and all the Customs of the Latins,' and decided to employ them as envoys to the Roman Pontiff. By them was sent a request for 'some hundred wise men, learned in the law of Christ, conversant in the Seven Arts . . . men able to show clearly, in the light of reason, that the Christian law was better than their own.' Niccolo and Matteo, provided with 'the golden tablet of authority' to secure quarters, horses, and men, took three years to reach Acre, arriving in 1269: 'they could not always ride on account of foul weather or snow or rivers that were big.'

When the Polos set out to go back to the court of the Great Lord, leaving Venice in the summer of 1271, it was with

Marco, then seventeen years of age. Two preaching friars, the men of learning, deserted at an early stage of the journey, and handed over their credentials and the letters from the Pope to the Polos.

In broad outline the route followed by the three Polos is established, although in detail, and in some considerable sectors doubt arises. From a port on the Gulf of Alexandretta they went via Tabriz to Hormuz on the Persian Gulf, thence north and east, through Balkh and on across the Pamir region: then on through the oases of Kashgar and Khotan, across the Gobi desert and the Mongolian steppes, to the summer palace of Cublai Khan at Chandu (Shang-tu). Three-and-a-half years were thus occupied, and the travellers were well received, young Marco being greatly in favour. Soon he adopted Tartar manners and 'knew four languages, and their alphabets and manner of writing.' He travelled extensively, sometimes on missions for the Great Lord, as to Yunnan, and north Burma and possibly to the west coast of India.

After seventeen years in the Far East, all three were allowed to return, but permission, we are told, was most reluctantly conceded, so highly were they esteemed. The Polos acted as

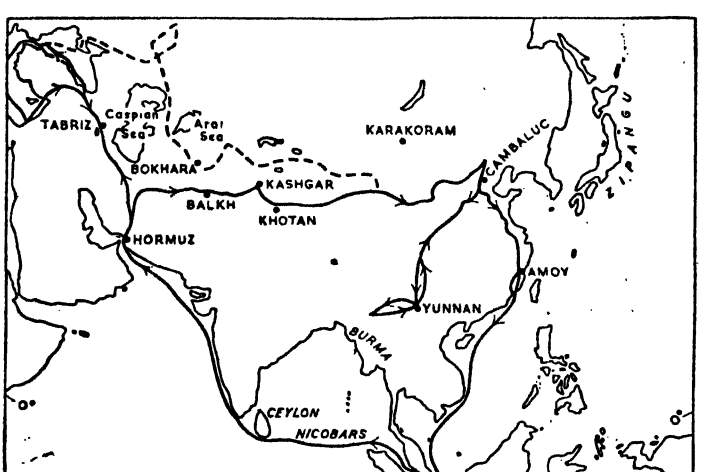

Fig. 4. The Asiatic Journeys of the Polos.

escort to a 'beautiful and charming' young lady of seventeen, who was to be the bride of Argon, Khan of Persia. No less than fourteen four-masted sailing ships sailed from Zaiton (Ch'uan chou fu, near Amoy) via Java, the Straits of Malacca, the Nicobars, Ceylon and Malabar to Hormuz. We are told that only eighteen arrived, although six hundred, in addition to the sailors, left China; allowance made for Marco Polo's customary exaggeration, the death roll must have been heavy. After delays in Persia, the travellers proceeded overland via Tabriz and Trebizond, to Constantinople, and in 1295 returned to the astonished fellow citizens in Venice—having set out on their return journey early in 1292.

Marco Polo dictated an account of his experiences to Rustichello of Pisa, a fellow prisoner-of-war in Genoa, in 1298. Beazley has summed up the character of the man, as revealed in an epic narrative of endless fascination:

'We can see in his Record the man of the world and of business, alive to the value of money and material good, interested in all commercial affairs, a careful albeit rather solemn, observer of new and quaint customs, passionately fond of sport and the chase, and of very liberal, though orthodox mind, a foe of heretics, but an admirer of the Buddha. Very occasionally he shows a little dry humour, but he does not often or freely indulge in laughter. His worst fault is a certain conventional exaggeration. Every town in the far lands he traverses is "great"; everything about Cathay is superlative; all the measure of Kublai are miracles of wisdom. His geographical notions and definitions are not very scientific or precise; he calculates the height of the Pole star by cubits; he is astonished to lose sight of the Northern Pole in the East Indies. Though he frequently gives us bearings and distance-reckonings, they are of a rough and ready order; when indicating the direction of his routes he cares little about his variations, or about sub-divisions of great compass points.'

The *Travels* open with an impressive rhetorical passage:

'Emperors and Kings, dukes and marquesses, counts, knights and burgesses, and all ye, whoever ye be, who wish to know of the various races of men, and of the diversities of the different regions

of the world, take this book and have it read to you. You shall find in it all the mighty wonders, all the great singularities of the vast regions of the East—of the Greater Armenia, of Persia, of Tartary, and of India, and of many a country besides—set down by us clearly and in due order, as they were recounted by Messer Marco Polo, called *Milione*, a wise and noble citizen of Venice, who saw them with his own eyes. Some things there will, in truth, be that he did not see, but only heard tell of by men worthy of credit. And we will set down the things seen as seen, and those heard as heard, that our book may be correct and truthful, without any falsehood. And all who read this book or hear it read, must believe it, as all the things contained in it are true. For I tell you that ever since the Lord our God did with his own hands mould our first Father Adam, there never was up to the present day any man, Christian or Pagan, Tartar or Indian or of any other race whatsoever, who knew and explored so great a part of the various regions of the world and of its great marvels, as this Messer Marco knew and explored. . . .'

A passage relating to the roc or gryphon of certain islands of the Indian Ocean will serve to illustrate the fact that what Marco Polo saw could be as astonishing as what he heard from others:

'About this bird I will tell you what those who have seen it relate; then I will tell you what I myself have seen. They say, then, that it is so big and so strong, that it can take up an elephant in its talons, lift it up in the air to a great height, and then let it fall down to the ground, so that it is dashed to pieces. Then the bird swoops down, and tears it with its beak, and eats it. . . . Those who have seen it, say also that the span of its wings reaches 30 paces, and that the wing-feathers are 12 paces long. . . .'

Later we are assured that an envoy of the Great Khan took to him a wing-feather—'And I, Marco Polo, measured it, and I found it to be 90 of my spans in length; and the compass of the quill end was twice my palm; truly it was a marvellous sight to me. . . .' There are incidents that to the modern reader are certainly imaginative, while to many of Marco Polo's contemporaries much that is factual was regarded as in the long-established tradition of 'travellers' stories.' There

are, of course, inaccuracies in historical digressions, partly due to following traditional beliefs and giving them a personal interpretation—we find Prester John, for example, referred to as the ruler of the Tartars, before they had a 'King of their own':

'they paid tribute to a mighty monarch, whom in their tongue they called UncKan, which in the French language we call Prestre Johan. This was the Prester John, of whose great power the whole world speaks. . . .'

Later in the text, in relation to the 'great province of Tenduc' (Tien-te) we are told that one, George, descendant of Prester John, and the sixth king ruling after him, administers it for the Grand Khan, and 'that is the place that in our country is known as Gog and Magog, but they call it Ung and Mungul.' In geographical description, however, even allowing for shortcomings, we have a degree of attainment that has received tribute from great modern travellers in Asia—by Sir Aurel Stein, Sir Percy Sykes, Sven Hedin and others.[5] We can select only examples from many striking passages to show the style and content of Marco Polo's work.

Sir Aurel Stein recalled Marco Polo's visit to the Pamir region when he beheld the lake, Zor-kol, some 14,000 feet above sea level, surrounded by snow-clad peaks. The Venetian described how, after leaving Wakhan,

'one travels three days to the north-east, always through mountains. One ascends so high that they say it is the highest place in the world. On reaching these heights one finds a plain between the mountains, with a great lake, whence issues a very fine river. There is the finest pasture in the world. . . . There is great abundance of all kinds of game. There is also an enormous number of wild sheep, of very great size. . . . There are also large numbers of wolves that kill and eat many of those sheep. Hence large quantities of horns and bones are found, great piles of which are made along the roads to point out the way to travellers when the ground is covered with snow. To cross this plain one rides no less than twelve days. It is called Pamier. During all these twelve days, you find no houses nor grass, so that travellers must bring their food with them. Not a bird is to be seen flying on account of the great

altitude and the cold. And I tell you, that on account of this great cold, fire does not burn so clearly, nor is it of the same colour as elsewhere, and it cooks food less well.'

Another striking passage relates to the desert of Lop—

'Lop is a large city of the border of the Great Desert, which is called the Desert of Lop. It stands between the east and the north-east, and belongs to the Great Kaan. The inhabitants worship Mahomet. And you must know that those who wish to cross the Great Desert take a week's rest in this city in order to refresh themselves and their animals. At the end of the week they take food for a month for man and beast, and, leaving the city, enter the desert.

'You must know, too, that this desert is said to be so long that it takes a year to cross it from one end to the other, but where the width is least it is a month's journey. It is all mountains and sand and valleys, and nothing eatable is to be found in it. After riding a day and a night, however, one finds some drinking water in winter, sufficient not indeed for a large number of people, but for some 50 or 100, with their animals. And across the desert one must always ride a day and a night to find water. In three or four places the water is brackish and bitter, but elsewhere it is good. In all there are about twenty-eight places with water. There are neither beasts nor birds, for they find nothing to eat. . . .'

Marco Polo gives many details about his experiences in Cathay and Mangi, broadly corresponding to north and south China respectively. His enthusiasm for the wonders of Cambaluc, with its winter palace, ten days' journey from Chandu, is boundless.

'You must know that . . . the houses and inhabitants of Cambaluc amount to such an immense number that it is not possible to count them. . . .

'You must also know that in very truth there is no city in the world to which such rare and costly wares are brought. . . . All the rare things that come from India are brought to Cambaluc—precious stones, and pearls, and all kinds of other rarities. And also all the beautiful and costly products of Cathay. . . .'

Cambaluc is described as the hub of an imperial road system, the basis of the Tartar domination, provided with post

houses, and in the aggregate with large numbers of horses and men—

'Someone might wonder how there are people enough to perform all these duties, and how they live. The answer is that all the Idolaters, and the Saracens likewise, each take six, eight, or ten wives . . . and beget an infinite number of children. . . . As for food they have enough. . . .'

The city of Kinsai (Hangchow), capital of Mangi, is described as 'the noblest and richest city in the world.' The manifold attractions of the city, and the customs of the inhabitants, are related at length, and we are informed that there are no less than 1,200 cities in Mangi. Kinsai has its port, some twenty-five miles away, on the shores of the 'Ocean Sea,' from which a navigable river leads to the capital, but the great port of Mangi is Zaitun, 'whither all the ships of India come.'

Not only do we catch glimpses of the China Sea, part, we are assured, of the great Ocean Sea, but we are told of the sea opposite Mangi:

'according to the good sailors and pilots that navigate it, and who know the truth, there are 7,448 islands in it, the majority of which are inhabited. I will add that in all these islands, there is no tree but . . . is valuable. . . . There are also many precious spices. . . . The amount of gold and other precious things in these islands is truly prodigious. But I must add that they are far away. . . . When the ships of Zaitun and Kinsai sail thither, they obtain great profit and gain, but they toil a whole year on their voyage, for they go in winter and return in summer, as only two kinds of wind blow there—one which carries them out, and one that brings them home again: one blows in summer and one in winter.'

Chipangu (Zipangu), one of these islands, is Japan, and like Cathay and Mangi is painted in attractive colours, although in summary fashion:

'Chipangu is an island towards the east, in the high seas, 1,500 miles from the Continent. It is a very large island. The people are white, courteous and handsome. They are idolaters. They are independent, and know no lordship but their own.

'You must know that they have immense quantities of gold, because it is found on the spot in great abundance. Moreover, no one ever brings the gold away from the country, for no one goes thither from the continent, not even merchants. That is why they have as much gold as I have said.

'I will tell you, too, of a great wonder concerning one of the palaces of the Lord of this island. You must know that he has a very large palace, all covered with fine gold. Just as we roof our houses and churches with lead, so this palace is all roofed over with fine gold; so the value of it is such that one can barely calculate it. Further, the floors of the chambers, of which there is a great number, are also of fine gold, over two fingers in thickness. And all the other parts of the palace . . . are similarly adorned. . . .

'They have pearls in abundance, of a rose colour, very beautiful and round and large. . . .'

The Polos had successors, successors who left records poor compared with his robust narrative, but whose deeds were astonishing enough. Such were John of Monte Corvino, founder of the Latin Church in China, who relates that he sought, without success, the Terrestrial Paradise, and men and animals, of a marvellous kind; and Oderic of Pordenone, who omitted much from his narrative lest 'it be too hard for belief,' but probably visited Lhasa, and came very near to Paradise in Ceylon. After the mid-fourteenth century, however, Europeans rarely passed beyond the western gateways to Asia. Political changes in China and conversion of the western Tartars to Islam were leading causes of the passing of the 'age of nomad peace.'

Were all the advances unnoticed by those who wrote of geographical matters? Exceptions were rare. We have noticed that Vincent of Beauvais shows interest in Carpini; and Roger Bacon, also of the thirteenth century, knows of Rubruck. On the other hand, Cardinal Pierre d'Ailly, famed for his *Compendium Cosmographiae*, a commentary on a Latin translation of Ptolemy, published in 1413, was entirely concerned with old views on old topics.

We have noted that the Middle Ages lacked a new Ptolemy; none the less, maps were produced, maps of great interest. The early ones were mere sketches, placed in general works

dealing with philosophy, theology, and cosmography, small and crude in the extreme. Some of the later *mappaemundi* were artistically attractive, as, for example, the late thirteenth-century Hereford map. In decorative fashion they illustrated ideas.

For the Mediterranean Sea coasts surprisingly accurate maps exist dating from about the year 1300, the 'portolan' charts; but these are mainly of interest in relation to the history of navigation. In time, however, maps came to have this portolan nucleus and conjectural and speculative margins, suggested outlines of the newly discovered lands, at least in part. The *Catalan Atlas* of 1375 shows mediæval cartography at its best; there are inscriptions, and potentates, camels, and elephants, and all manner of alluring wonders are depicted; and what to us is of great interest, there is some representation of Melli and the Sudan, some representation of Cathay and the East. The technique is still somewhat haphazard—Zipangu finds no place. In the celebrated Behaim globe of 1492 Polan influence is seen again, but so also is an Africa that shows great Portuguese advances; these we must now consider.

[1] G. H. Kimble, *Geography in the Middle Ages*, London, 1938.

[2] See introduction to Ibn Battúta, *Travels in Asia and Africa*, 1325-54. Selected and translated by H. A. R. Gibb. Broadway Travellers, London, 1929. Quotations and place identifications are from this work. (Courtesy of Routledge & Kegan Paul, Ltd.).

[3] C. R. Beazley, *The Dawn of Modern Geography*, 1897-1908. This three-volume work on the period 300-1420 is a fundamental contribution. Quotations by permission of the Clarendon Press, Oxford.

[4] Quotations are from *The Travels of Marco Polo*, translated from the text of L. F. Benedetto, by Aldo Ricci, with introduction by Sir E. Denison Ross. Broadway Travellers, London, 1931. (Courtesy of Routledge & Kegan Paul, Ltd.).

[5] See, for example, Sir Percy Sykes, *A History of Exploration*, 2nd Edition London, 1950. (Routledge & Kegan Paul, Ltd.).

3

THE GREAT AGE OF MARITIME DISCOVERY: THE PORTUGUESE

The Great Age of Maritime Discovery is but one phase of the general change that marks the passing of mediæval and the advent of modern times. This process varied in pace in intellectual, artistic, religious and political fields of activity, and in various countries. Certainly a great factor in the change was exploration on a grand scale. This led to an alteration in world outlook, in the fortunes of nations, to new trends of trade, conquest and settlement, as well as extension of geographical knowledge and profound change in geographical ideas.

The best known landmark is the first voyage of Columbus, westward across the Atlantic, in 1492. Also outstanding in the early phase are the voyages of Vasco da Gama to India via the Cape of Good Hope in 1498, that of John Cabot westward from Bristol in 1497, and those of Amerigo Vespucci. Towards the close comes the effort of the amazing Magellan, a Portuguese in the service of Spain, who sailed in September 1519, found the strait named after him, and met his death in the Philippines. One of his ships, the *Victoria*, completed the first circumnavigation of the globe, by returning to Seville via the Indian Ocean and the Cape, in September 1522.

Although Italians figure frequently as leaders, and play a leading rôle in the diffusion of the new knowledge, men of Portugal and Spain play the leading part in the Great Age. This was 'not because they were the first people to the imbued with the modern spirit of enquiry,' but because 'paradoxically they were the last to retain the mediæval inspiration of the crusaders, the paladins and the knights-errant, long after the

ages of faith had waned among the other nations of Western Europe into the scepticism of the Renaissance.'[1]

This chapter will treat of the Portuguese discovery of the eastern sea route to India and its prelude. Unfortunately, the historical record is very inadequate; in the view of some, owing to a deliberate Portuguese policy of suppressing information that might assist economic and political rivals; according to others, owing to the lapse of time and the Lisbon earthquake of 1755, in which old records were destroyed.

It seems certain that European contacts with the Atlantic coast of Africa, interrupted perhaps for a thousand years, were renewed in the later Middle Ages, before the Portuguese began their persistent efforts to pass Cape Bojador, i.e. *c.* 1420. Only fragmentary information is available, but it shows early adventurers to be Italian. Malocello rediscovered the Canaries, *c.* 1270, and the Vivaldi brothers are credited with the ambition of reaching India by sailing round Africa in 1281 or 1291. The then accepted terminus of coasting (and it seems to have remained such until about the mid-fourteenth century) was Cape Non (Nun) in 28° 47′ N. It was regarded as natural that after being so rash as to pass this point the Vivaldi brothers should have vanished.

In the fourteenth century there is evidence of Portuguese and Italian collaboration, and Prestage finds 'reason to think that . . . the Portuguese had found Madeira and some of the Azores, as well as the Canaries.'[2] A west African 'River of Gold' was sought, e.g. by the Catalonian Jaime Ferrer in 1346, and a portolan chart of 1367 shows knowledge extending to Cape Bojador. Kimble argues, indeed, that the anonymous author of what came to be known as the *Book of the Spanish Friar*, written *c.* 1345, was not solely a plagiarist and romancer, but had first-hand acquaintance with the coast beyond, possibly to the Sierra Leone area, and even vague ideas of the easterly trend of the Guinea coast.

Prince Henry (1394–1460), is the leading figure in the Portuguese drive for some forty years, although he never sailed farther than the Straits of Gibraltar. His claim to fame comes from his patient organisation of effort towards an objective

regarded by most as impossible or unprofitable or both. He brought together all available material bearing on the problem and enlisted experts on navigation and astronomy. He seems to have set up an academy at Sagres on Cape St. Vincent, building a small town for his headquarters. The *Chronicle of Guinea*, written by his friend Azurara in 1453, although incomplete, brings the story down to 1448, and is the chief source of information.

What were Henry's motives? There has been a good deal of argument on this subject. Azurara writes that he

'desired to know what lands there were beyond the Canary Isles and a cape which was called Bojador, for up to that time no one knew, whether by writing or the memory of any man, what there might be beyond this cape. Some believed that St. Brandan had passed it; others said that two galleys had gone thither and had never returned . . . and the Infante Dom Henrique desired to know the truth of this for it seemed to him that if he or some other lord did not essay to discover this, no sailor or merchant would undertake this effort, for it is very sure that these do not think to navigate otherwhere than to places where they already know that they will find their profit.'

Other reasons were the desire to find new profitable trade (gold known to exist somewhere south of the Sahara must have been a powerful lure), to know the full extent of the Infidel's power, and 'to know whether in those regions there might be any Christian princes in whom the charity and love of Christ were strong enough to cause them to aid him against these enemies of the faith.' Elsewhere in his narrative Azurara asserts that Henry wished to acquire knowledge of 'the Indies, and of the land of Prester John.'

It seems certain at least after a time Henry began to envisage the breaking of the Italian monopoly of eastern trade, and Marco Polo's descriptions of the East may well have influenced him. A Portuguese historian—of the following century, it is true—asserts that Henry believed in the circumnavigation of Africa in ancient times. Certainly the notion of ocean waters encircling the known world persisted in the Middle Ages, and there were *mappaemundi* to show the sea

extending to the south of Africa; it was rather the zone of heat near the Equator that was feared.

Azurara's *Chronicle* is interesting on the mental attitude of sailors to Cape Bojador—

'although many set out—and they were men who had won fair renown by their exploits in the trade of arms—none dared to go beyond this cape . . . because they had to do with a thing entirely novel, which was yet mingled with ancient legends which had existed for generations among the mariners of Spain. . . . "How shall we pass the limits established by our elders?" they said. . . . "This is clear," said the mariners; "beyond this cape there is no one, there is no population; the land is no less sandy than the deserts of Libya, where there is no water at all, neither trees nor green herbs; and the sea is so shallow that at a league from the shore its depth is hardly a fathom. The tides are so strong that the ships which pass the cape will never be able to return." . . .'

For twelve years Henry sent men who failed to pass Bojador, and secured a welcome on return only because they loaded their ships with slaves from other coasts. Gil Eannes, it was, who at last turned the cape in his second attempt in 1434. After his first failure, in the previous year, we are told that his master taunted him. 'You cannot meet there a peril so great,' said the Infante, 'that the hope of reward shall not be even greater. In truth I marvel at these misgivings that have possessed you all. . . . I am astonished to think you have them from the opinion of some few mariners who know only the navigation of Flanders . . . and do not know how to handle a compass or make use of a chart of the seas.' Eannes dispelled a myth and was 'knighted and rewarded largely.'[3]

Not only had Portuguese seamen the chart and the compass, but after 1440, according to Azurara, the caravel, an improvement on earlier craft. The early caravel of fifty tons or more was later further improved upon, for longer voyages, and vessels of 150 tons with four masts were employed. Moreover Madeira was a useful port of call, since it had been colonised by the Portuguese in 1420—especially as the well placed Canaries were disputed with Spain for decades and finally, in 1479, went to Castille by treaty.

By the year of Henry's death, 1460, exploration, step by step, had led to the passing of the Rio do Ouro, Cape Blanco, the Bay of Argium, the mouth of the Senegal, Cape Verde, the Cape Verde Islands, the Gambia, and arrival in the Sierra Leone region—perhaps even at Cape Palmas. Trade became lucrative, especially traffic in slaves, and it was seen that Prince Henry had made an excellent investment. Geographically the great landmark was the passing of desert and savannah coast and arrival off the hot, wet and forested coastlands of West Africa—soon to acquire a dismal reputation for disease. The Italian Cadamosto gives us an account of geographical interest, unusually free from traditional fiction. He made two voyages, with Portuguese permission, one in 1455, the other in 1456, to the region of the Gambia and the Jeba, and heard something of the interior—of Timbuktu, and Melli, and trans-Saharan trade: [4]

'In this empire of Melli it is very hot, and the pasturage is very unsuitable for fourfooted animals; so that of the majority which come with the caravans no more than twenty-five out of a hundred return. There are no quadrupeds in this country, because they all die, and many also of the Arabs . . . sicken in this place and die, on account of the great heat.'

It is clear that the contrast between lands north and south of the Senegal made a great impression on Europeans.

'The Rio de Senega, the first river of the Land of the Blacks . . . separates the Blacks from the brown people called Azanaghi, and also the dry and arid land, . . . from the fertile country. . . . The river is large; its mouth being over a mile wide and quite deep. He who wishes to enter this river must go in with the tide, on account of the shoals and banks at the mouth. . . . It appears to me a very marvellous thing that beyond the river all men are very black, tall and big, their bodies well formed; and the whole country green, full of trees and fertile; while on this side, the men are brownish, small, lean, ill-nourished, and small in stature; the country sterile and arid. This river is said to be a branch of the river Nile. . . . This river has many other very large branches, in addition to that of the Senega, and they are great rivers on the coast of Ethiopia. . . .'

Cadamosto relates that 'the King of Senega in my time was called Zuchalin . . . this King is lord of a very poor people, and has no city in his country, but villages with huts of straw only. . . .' The inhabitants grow no corn, barley, rye, spelt or vines, 'because the country is very hot and without rain for nine months in the year, that is from October to the end of June. . . . It appears that they grow various kinds of millet, small and large, beans, and kidney beans. . . . They drink water, milk or palm wine.' He notes also the use of a 'marvellous oil,' probably ground-nut oil, and that cotton is grown and made into garments for the privileged. Farther south, in the Gambia country, the people are described as very similar, but they grow varieties of rice and they have more cotton. The African animals attracted Cadamosto's attention, particularly the wild elephants, that frequent 'thick woods, where they wallow in the marshes like swine,' and the hippopotamus, the 'river-horse,' frequenting the Gambia and other rivers.

After the death of Prince Henry and a temporary check to progress down the African coast, comes an advance due to the fact that Fernao Gomes was given trading privileges for five years, on condition that 100 leagues of coast beyond Sierra Leone were explored every year. As a result, knowledge was extended to 2° south of the Equator, and the southerly trend in the African coastline realised.

In 1474, exploration projects were handed over by Affonso V to his son, John, who became John II in 1481, and profits from the now considerable gold export of the Mina (Gold Coast) region and from ivory and slaves, enabled him to finance an effective organisation for furthering the work begun by Prince Henry. His rewards for success were liberal, his treatment of failures harsh, and he is described as informed in the field of cosmography. Exploration was renewed by Diogo Cão, probably in 1482, and the Congo reached. His second voyage led him to the desert shores of south-west Africa, probably in 1485, as far as Cape Cross.

The expeditions of Bartholomew Dias sent by the African coast, and of Pedro de Covilhan and Alfonso de Paiva by the Mediterranean route, to find Prester John and reach India, followed. The allegedly powerful Christian monarch was

thought to be within reasonable sailing distance of known African coasts. As a result of reports received in 1486 from natives of the Benin pepper region, he had been identified with one, Ogane, who was thought to reside some 250 leagues distance to the east.

In 1487, John II launched his expedition to explore the possibility that 'by way of Prester John he might find an entrance into India because, by Abyssinian friars who had come to the Peninsula and by other friars who had gone from Portugal to Jerusalem with orders to get news of this prince, he had learned that his country was over Egypt and stretched to the Southern Sea.'[5] De Paiva travelled with Covilhan to Cairo, and by sea from Suakin to Aden; from there he went to Ethiopia, but died before his mission was completed. Covilhan sailed in a 'Mecca' ship to Calicut, a centre of the Indian spice trade. He appears to have gone to Goa, Ormuz and Sofala, and to have become convinced that the sea route to India was practicable. Whether his information reached Portugal before Da Gama sailed is unproven. Covilhan ended his journey in Abyssinia and resided there for thirty years.

As to the rounding of the Cape of Good Hope by Bartholomew Dias, Prestage notes that for 'the only connected account of the voyage we are dependent upon the historian Barros, who wrote more than half a century later, but it may be supplemented by the legends upon the contemporary map of Henricus Martellus (1489), the Portuguese chart of 1502, called after its Italian purchaser the Cantino map, and the Canerio map of the same date. The maps do not agree with one another, and in many cases they do not tally with Barros's account.'

According to Barros, Dias from a point south of Walvis Bay, which he had reached by the orthodox route, was blown to the south by a strong wind for thirteen days. The Portuguese had reached southern temperate latitudes, and on this occasion the caravels suffered from cold, rough weather. When Dias steered to the east in the hope of making a landfall there was disappointment until, altering his course to the north, he reached the African coast in the vicinity of Mossel Bay. After sailing on to the mouth of the Great Fish River, in deference to the murmuring of his crews, Dias commenced his return.

After a voyage lasting more than sixteen months, he arrived in Lisbon in December 1488. Prestage ranks the achievement of Dias higher than that of Columbus. Moreover, 'Da Gama and Manoel might reap where Cão, Dias and John II had sown, but it is to these last that the credit of the victory really belongs.'[6]

The climax of Portuguese achievement came when the expedition led by Vasco da Gama left the Tagus in July 1497, two years after the accession of King Manoel. The leader was a soldier and administrator, but he was accompanied by two pilots who had served under Dias. To quote Prestage:

'When all was ready for the start, Barros tells us that King Manoel summoned the captains before him at Montemor, and in the presence of some notables declared that his motive in ordering the discovery of India was to spread the Christian faith and acquire the riches of the East. A white silk banner with the cross of the Order of Christ on it was placed in the arms of da Gama, who was kneeling, and he swore to bear it aloft before Moor and heathen, and in every peril of water, fire and steel to guard and defend it until death. Further, he promised to serve his King in the business with loyalty and diligence, keeping his commands until he came back, by the grace of God, in whose service he was sent. This act of homage accomplished, he received his instructions, letters of credence for delivery to Prester John and the King of Calicut.'

There were four armed ships, including one for stores. The other three were the *St. Gabriel, St. Raphael* and the *Berrio,* the latter a caravel of about fifty tons, the others larger than the earlier caravel type, square rigged, specially designed for the enterprise under the direction of Dias, and with a tonnage of about one hundred and twenty. Prestage points out that to obtain a modern equivalent the tonnage should be doubled. The total crews numbered one hundred and seventy, and the *St. Gabriel* was the flagship. Only a third of the personnel, with two ships, survived to return to Portugal, scurvy accounting for heavy losses.

The most reliable account of the voyage is provided by the anonymous *Roteiro,* a diary of a member of the expedition, but this does not provide much information, and there is a

good deal of traditional hypothesis in the accounts given of the da Gama enterprise. If these are accepted, the outstanding feature of the Atlantic section of the route was the decision, after passing the Canaries and provisioning at the Cape Verdes, to sail boldly south to about 20° S. 20° W., and then east to a point near St. Helena's Bay. This open sea voyage lasted for ninety-six days, but the troublesome calms of the equatorial doldrums on the Guinea coast were avoided.

After the African landfall several calls were made on the coast before Malindi was left and the ships headed for Calicut. The Cape was rounded in the southern summer. Between Mossel Bay and the coasts frequented by the Arabs was a stretch of some eight hundred miles, now visited by Portuguese for the first time. Sofala was passed, but calls were made at Kilimane and Mozambique and the reception friendly, until the Arabs realised that the newcomers were Christians and potential trade competitors, when they became hostile. This happened at Mombasa. The shores of Africa were left at Malindi on April 24th, Calicut reached on May 16th, 1498, a very striking performance.

The Indian coastal tract proved to be divided amongst various factions, not unwilling to trade. The somewhat paltry gifts presented by Vasco da Gama were poorly received, and there were early signs of hostility from Moslems, who succeeded in thwarting his diplomatic mission. The leader succeeded in extricating himself from an awkward and dangerous position, and in late August the return was commenced.

On this occasion there was no favourable monsoon wind in the Arabian Sea and Malindi was not reached until January 7th, 1499, after great hardship. This was a valuable port of call since the Sultan was friendly. The Cape of Good Hope was passed on March 20th, the Tagus entered on September 29th. The voyage had lasted rather more than two years, its leader was richly rewarded. Not only had the Indian trade become practicable, but it was hoped to supplement the products of Guinea by gold and ivory from the east African coast, after breaking the Arab monopoly. The intermediate African coasts

had been shown to lack possibilities of 'easy profit.' By 1512 contact had been made with the Moluccas.

Duarte Pacheco, in his *Esmeraldo de Situ Orbis*, a work on cosmography and navigation written mainly in 1505, devotes much space in his first three books to the results of exploration under Prince Henry, Affonso V and John II respectively, the first book dealing also with such matters as the distribution of land and sea, division of the continents, calculation of latitude, computation of the tides. According to his prologue, the fourth and fifth books were to treat of the discoveries of King Manoel, but only a short portion of the fourth survives and nothing of the fifth. The work may never have been finished; he writes in spite of 'railers, back biters and slanderers, who blame what is well done and are unable to do anything well themselves.' Parts of the work may have been suppressed. In Kimble's view, 'there can be little reasonable doubt that the *Esmeraldo* was censored.' It is in the fourth book that the following interesting passage occurs:

'Our own predecessors and those who lived even earlier in other countries could never believe that a time would come when our West would be made known to the East and to India as it now is. The writers who spoke of those regions told so many fables about them that it seemed utterly impossible that the seas and lands of India could be explored by the West.

'Ptolemy in his portrayal of the ancient tables of cosmography writes that the Indian Sea is like a lake, far removed from our western Ocean which passes by southern Ethiopia; and that between these two seas there was a strip of land which made it completely impossible for any ship to enter the Indian Sea. Others said that the voyage was so long as to be impossible and that there were many sirens and great fishes and dangerous animals which made navigation impossible.

'Both Pomponius Mela . . . and Master John Sacrobosco, an English writer skilled in the art of astronomy . . . said that the country on the Equator was uninhabitable owing to the great heat of the sun, and since it was uninhabitable for this reason it could not admit of navigation. But all this is false and we have reason to wonder that such excellent authors as these, and also Pliny and others writers who averred this, should have fallen into so great an error; for they all allow that India is the real East and that its

population is without number. Since the real East is the Equator, which passes through Guinea and India, and since the greater part of this region is inhabited, the falsehood of what they wrote is clearly proved, for at the Equator itself experience has shown us that the land is thickly populated. Since experience is the mother of knowledge, it has taught us the absolute truth; for our Emperor Manuel, being a man of enterprise and great honour, sent out Vasco da Gama, Commander of the Order of Santiago, one of his courtiers, as captain of his ships and crews to discover and explore those seas and lands concerning which the ancients had filled us with such fear and dread; after great difficulty he found the opposite of what most of the ancient writers had said.'[7]

We concluded our last chapter by referring to the globe of Martin Behaim, dating from 1492, and we return to this topic once more. His globe shows the influence of Marco Polo, of Ptolemy, and of the Portuguese discoveries on the coast of Africa, but the inaccuracies in relation to the latter, present something of an enigma. Portuguese maps showing the discoveries are lacking—there are Italian maps and the Behaim German globe, and Kimble suggests that the information the authors were allowed to use was deliberately made as unrevealing as possible; accurate and recent knowledge, he argues, was never released. A fair degree of accuracy might otherwise have been expected from Behaim, since he has been acclaimed by some as a great cosmographer and mathematician, and this Nuremburg merchant was in Lisbon shortly before the globe was made. Ravenstein argues that the German was an impostor, who tried to show that Cão and he were the first to round the Cape. He claimed to have sailed with Cão—yet the Congo mouth on his globe is in 24° S., while in reality it is some 18 degrees of latitude farther north.[8]

[1] See the introduction to A. P. Newton (editor), *The Great Age of Discovery*, London, 1932.

[2] E. Prestage in A. P. Newton (editor), *Travel and Travellers of the Middle Ages*, London, 1926.

[3] Quotations from V. de Castro E. Almeida, *Conquests and Discoveries of Henry the Navigator*, London, 1936. (Courtesy of G. Allen and Unwin, Ltd.)

[4] Quotations from *The Voyages of Cadamosto*, translated and edited by G. R. Crone. Hakluyt Society, London, 1937. (Permission for the numerous quotations made from the publications of the

Hakluyt Society in this work has been kindly granted by the Council.)

[5] Quoted from E. Prestage, *The Portuguese Pioneers*, London, 1933 (permission of A. & C. Black, Ltd.)

[6] E. Prestage, *The Portuguese in South Africa*. Cambridge History of the British Empire, Volume VIII, 1936. (Quotations by permission Cambridge University Press.)

[7] Quotations from *Esmeraldo de Situ Orbis*, translated and edited by G. H. T. Kimble. Hakluyt Society, London, 1937.

[8] E. G. Ravenstein, *Martin Behaim. His Life and His Globe*, London 1908. This work is especially valuable for its reproduction of the globe in gores, on the scale of the original.

4

COLUMBUS

A glance at a globe will show that it is in the extreme north of the Atlantic Ocean that distribution of land and sea is most favourable to contact between Europe and North America. The intermediate position of the Orkneys, Shetlands, and Faroe Island groups, together with Iceland and Greenland, means that in terms of distance the crossing is easier there than farther south. The possibilities are known to have been utilized by Norsemen in the late tenth and early eleventh centuries, and probably Norsemen from Greenland made contacts, more or less continuously for a long time afterwards; their influence on the Cree, and other Indians, seems to be established. There is some corroborative archæological evidence to supplement the 'Wineland' story which rests on traditional saga narratives surviving in the *Codex Flatöiensis* of the fourteenth century. Mention is made of 'Helluland,' 'Markland' and 'Vinland,' commonly identified with Labrador and areas farther south; precise interpretation is impossible, but there is some ground for the view that 'Wineland' might be in the Great Lakes area.[1] In addition to references to forests, to vines, to 'Skraeling' inhabitants, there is mention of mild winters, and it has been suggested that Norse journeys extended possibly to what is now North Carolina. Allowance must be made for possible climatic

change, even in these latitudes; it is well attested for southern Greenland and therefore presumably for Labrador. In south-west Greenland the Norse coastal settlements were established when conditions were more favourable than they are to-day; they failed, in fact, to survive steadily worsening climatic conditions, and dwindled to eclipse after some four hundred years.

Whether this Norse episode influenced later exploration is uncertain. The notion that Columbus, if indeed he sailed to Iceland in the late fifteenth century, like the seamen of Bristol, came to hear of known lands to the west, is sometimes advanced. That Columbus was aware of the search for islands farther south in the Atlantic is certain. Before Columbus sailed in 1492 the Azores, Madeira, the Canary and the Cape Verde islands were known, and active search had been proceeding for others for some decades by the Portuguese, and for at least a decade by the men of Bristol.

The legendary history of islands in the Atlantic goes back to very early times if Atlantis can be considered under this heading. This, according to Plato, was a foundered continent in the western ocean, destroyed with its Utopian civilization by the angry god Poseidon, some nine hundred years before his time. In the Middle Ages, and even later, strongly held beliefs in the existence of fabulous islands were current and only in part, in the course of time, were they identified with actually existent islands.

The globe made by Martin Behaim has inscriptions of apparent but spurious accuracy, relating to traditional islands placed in varying positions, both in earlier and later cartographic works. Of St. Brandon's isle he writes, 'in the year 565 after Christ, St. Brandon in his ship came to this island, where he witnessed many marvels, and seven years afterwards he returned to his country.' Of Antilia, 'in the year 734 of Christ, when the whole of Spain had been won by the heathen (Moors) of Africa, the above island Antilia, called Septe citade (Seven cities) was inhabited by an archbishop from Porto in Portugal . . .'[2] The Portuguese early identified the island of the Seven Cities with Antilia, and there are records of permission being given to individuals to search for it, at least from 1452 on. Whether it is true or not that an 'unknown Portuguese pilot'

told Columbus of an island that he had found in the west, it is certain that search for new islands was a current ambition. It is this fact that provides part of the case for the alleged pre-Columbian discovery of America by the Portuguese.

That the Portuguese policy of secrecy robbed another of the fame that attaches to Columbus, that 'the Lisbon archives may any day yield further and convincing evidence that America was discovered by the Portuguese before he reached the Antilles,'[3] is possible. It appears almost certain that through Fernam Martins of Lisbon a Portuguese enquiry was made of the Florentine cosmographer, Toscanelli, for his views on the possibility of reaching the east by westward sailing, across the Ocean, and that a favourable reply came in 1474, together with an illustrative chart. Toscanelli took a favourable view of the longitudinal extent of the known world, and making allowance for Marco Polo's assertions, argued for example that the great city of Quinsay in Mangi, or south China, was but five thousand nautical miles west of Lisbon.

The Portuguese were not, apparently, tempted to test this belief, and as it proved they were many years ahead of their rivals in reaching the marts of Asia by sea. It should be noted that Cabral perhaps accidentally, in the year 1500, did encounter the east coast of South America. The configuration of the South Atlantic is such that allowing for the vagaries of winds and currents, mariners *en route* to the Cape of Good Hope were almost certain to do so, sooner or later. Thus there is every reason to believe that the discovery of the New World was inevitable at about the time when in fact contact was made by Columbus in 1492.

There is a large literature relating to Columbus and much of its subject matter is extremely intricate, and to some, rather futile. The subject has strong romantic attraction and a very inadequate basis of ascertained fact. Controversy arose in the lifetime of Columbus, and after some centuries of quiescence, during which an uncritical and largely legendary version of the story monopolised the field, burst forth with renewed vigour in the late nineteenth century. All that can bear on the story has probably by now been brought to light.

The publication by the Italian government in the years

1892–94 of the great collection of material known in brief as the *Raccolta Columbiana*, was a great landmark. Doubts remain on many matters, but none the less the available material is not unimpressive. Much of that commonly used, still too often uncritically, is provided by the writings of Columbus himself, which often show deliberate obscurity and reticence; the epoch-making letters of Peter Martyr Anghiera, sagacious Italian cosmographer in Spain, to friends in Italy; the *Historie* written by Columbus' son Ferdinand, completed shortly before 1539, an Italian version of which survives; and the *Historia de las Indias* of Las Casas, completed in 1563. The works of Ferdinand and of Las Casas, a friend of the family, have been shown to have weaknesses.

Contrary to the statement of Columbus, his son Ferdinand, and Las Casas, it has been established that Christopher was a man of humble origin. Born in Genoa in 1451 he early followed his father's occupation of weaver and tavern keeper, and the fact that he never wrote in Italian but always in Castilian would appear to indicate that he acquired his learning late in life. Genoa provided ample outlet for his love of the sea, and voyages were made in the 1470's in the Mediterranean and in the Atlantic, certainly to Bristol and to Lisbon, where he had settled by 1479; his brother Bartholomew, maker of charts, had probably preceded him there. Columbus always showed business acumen and probably these years saw him engaged in trading transactions and making social progress.

Whether his great ambition was conceived earlier or not, he now came into touch with successful navigators, some of whom had disproved already one deeply rooted belief by sailing in allegedly unattainable waters off the African coast. He himself seems to have sailed to Guinea, and very soon after, in 1483 or 1484, he petitioned John II of Portugal for approval of his discovery project. The king's advisers reported adversely and within a year Columbus left Portugal for Spain.

In April 1486 at the court of Ferdinand and Isabella of Castille this man with a mission secured an audience, but long deliberations followed before he finally sailed on August 3rd, 1492. He wrote later, in a preamble to his account of the third voyage:

'Most serene and most high and most powerful princes, the king and queen, our sovereigns: The Holy Trinity moved Your Highnesses to this enterprise of the Indies, and of His infinite goodness, He made me the messenger thereof, so that, being moved thereunto, I came with the mission to your royal presence, as being the most exalted of Christian princes and so devoted to the Faith and to its increase. The persons who should have occupied themselves with the matter held it to be impossible, for they made gifts of chance their riches and on them placed their trust.

'On this matter I spent six or seven years of deep anxiety, expounding as well as I could how great service might in this be rendered to the Lord, by proclaiming abroad His holy name and His faith to so many peoples, which was all a thing of so great excellence and for the fair game of great princes and for a notable memorial for them. It was needful also to speak of the temporal gain therein, foreshadowed in the writings of so many wise men, worthy of credence, who wrote histories and related how in these parts there are great riches. And it was likewise necessary to bring forward in this matter that which had been said and thought by those who have written of the world and who have described it. Finally Your Highnesses determined that this enterprise should be undertaken.

'Here you displayed that lofty spirit which you have always shown in every great affair, for all those who had been engaged on the matter and who had heard the proposal, one and all laughed it to scorn, save two friars who were ever constant. . . .'[4]

What was the enterprise of the Indies? The celebrated *Capitulations* of Sante Fe, while giving the exacting demands made by Columbus, and the royal promise of great rewards, of authority, of titles, of one tenth of the revenues, state the objective but vaguely—'to discover and to gain certain islands and mainland in the Ocean Sea.' He sailed from Palos armed with letters of credence that imply his destination to be the 'Indies,' but this was a very vague term. He carried also, if the *Journal* is to be believed, a letter of commendation to the 'Grand Khan.' However, it has been suggested too that this title was used vaguely to designate any great potentate that might be encountered, rather than in the precise sense in which it was used by Marco Polo. The fact that three small ships were involved has been an argument for a very limited objective.

Controversy has raged over these matters and we can only summarise the views held.

In the traditional view Columbus was seeking Cypangu and Cathay, convinced that the westward sailing route was not unduly long. Vignaud is the leading exponent of the theory that he sought initially new lands in the western ocean, and later, as an afterthought, developed the view that he had reached Asia. A third view is that Cathay was undoubtedly his objective, but that he also hoped to discover new lands on the way. A fourth advocated by Cecil Jane is that Columbus although clearly sailing for Cathay and Cypangu, could not expect to govern in this realm, and since the idea of a great new land in the ocean could not fit his cosmographical views, he may also have sought a southern continent, to be reached by following the coast of eastern Asia southwards.

This latter view has been deemed inadmissible by E. G. R. Taylor because it would imply that Columbus did not hold the orthodox view of his day, 'that there was but a single limited tripartite land area, inhabited by men, surrounded by the ocean, and interpenetrated by five seas,' and would imply also that he did not subscribe to the Christian dogma that no land could lie beyond its limits with human inhabitants, since they could not have survived the flood, and lived beyond the possible reach of the Gospel—monsters there might be, but not men.

The geographical notions entertained by Columbus before he sailed in 1492 are the subject of controversy, because it is frequently argued that his known views were developed in later years, when he defended his conviction that he had reached parts of eastern Asia on the first voyage. It is, however, not at all certain that all of his marginal notes in the works of Marco Polo, cardinal Pierre d'Ailly, Pliny and Pope Pius II in fact post-date the first voyage. Although Vignaud and others have attacked the authenticity of the correspondence wih Toscanelli, who died in 1482, the current trend is towards acceptance of it, and this would show Columbus probing into such questions as the distance between Iberia and Cathay, in these early years. He could find encouragement not only in the view of Toscanelli, who believed that Cypangu was

but two thousand miles beyond Antilia, but for example, in the writing of d'Ailly, who led back to the church fathers and the ancients, to Roger Bacon and to Seneca; had not the latter declared that a few days' sailing, if winds were favourable, would account for the gap between Spain and India?

Quite certainly Columbus only shared the view of informed contemporaries in believing that the world was round. The issue concerned the distance between the extreme east and the extreme west, across the western ocean. Ptolemy estimated the length of the known world of his day as 180 degrees of longitude, Columbus preferred the views of Marinus of Tyre, which gave a longitudinal range of 225 degrees, and allowing for Marco Polo's revelations he argued for 285 degrees eastward from Spain to Cypangu. Moreover he took a smaller estimate of the world's circumference than either Ptolemy or Marinus, and so concluded that the distance from the Canaries to Cypangu was some 2,400 nautical miles, about one fourth of the true distance in a direct line. Had not Esdras stated that only a seventh part of the earth was covered by water, and the other six were dry land? Searching through literature that showed various views he always chose to believe those that favoured his mission.

Much more attention has been devoted to the ideas and objectives of Columbus than to reconstruction of the four voyages he made to the west. An American, S. E. Morison, has tackled this problem by actual sailing in comparable craft, in part at least of the wake of Columbus. The work of the Harvard Columbus Expedition of 1939–40 is unique in this respect.[5] Morison makes it clear that little is known of the ocean routes followed in the later voyages, apart from point of departure and landfall, except for the outward route of the third; but a reconstruction of the first is possible. He finds that the précis of the lost *Journal* to be found in the writings of Las Casas, is a reliable guide when tested at sea.

Columbus sailed from the little port of Palos on August 3rd, 1492, with three vessels, the largest, the flagship *Santa Maria* under the command of Juan de la Cosa, noted pilot and cartographer, and two caravels, the *Pinta* and the *Nina*, under the command of Martin and Vicente Pinzon respectively. Par-

ticulars of these ships are lacking and reconstructions are conjectural, but they have been estimated to have been about twenty to twenty-five yards long and to have had a draught of about six feet. The total personnel of about ninety consisted almost entirely of Spaniards; the alien origin of the leader was to have unfortunate repercussions later. Martin Pinzon is credited by some with having played a role in the enterprise that has received very inadequate recognition.

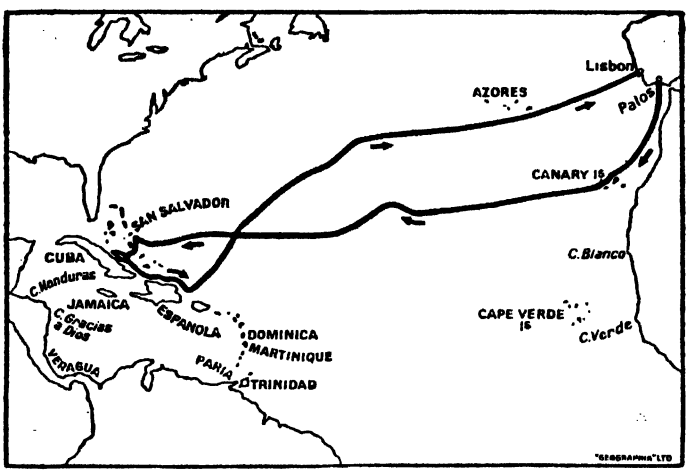

Fig. 5. The first voyage of Columbus

The first call was at the Canary islands, which were left on September 6th, and after a prosperous voyage Watling Island (Guanahani or San Salvador) or perhaps nearby Conception Cay, in the Bahamas, was sighted on October 12th. Columbus had not mastered the rudiments of celestial navigation even as established in his time, but according to Morison showed great ability in the use of dead reckoning methods, using the compass and estimating speed and distance. Reconstruction of the voyage shows that the parallel of 28° N. was followed to about 42° W., about half-way across the ocean; the highest latitude reached was approximately 29° N., the landfall was in 24° N. Columbus proceeded along the north coast of Cuba (Juana),

then turned back and followed much of the northern coast of Haiti (Española), founding a settlement at La Navidad; he returned with two ships only, the *Santa Maria* having been lost, leaving Española on January 4th, 1493. His homeward route was first north-east, then east to the Azores, which were reached on February 18th. Bad weather was the reason advanced by Columbus for the curious fact that he first entered the Tagus; after an interview with John II of Portugal he proceeded to Palos, arriving on March 15th.

Winds and currents were favourable for an outward passage from the Canaries, in the zone of the north-east trades, and a return passage farther north in the zone of the prevalent westerlies, to the Azores. Whether, as it has been argued, Columbus had made a study of winds and currents in the eastern North Atlantic, and showed great sagacity in his choice of routes cannot be proved.[6] His return route was orthodox enough for a direct course to Palos, and the outward has been related to the westerly outpost position of the Canaries, an admirable provisioning base, and to the latitude of the supposed objective.

The famous Columbus letter which gives some account of the first voyage shows clear signs of having been edited; it has been suggested by Jane that it is a 'draft semi-official despatch' and it gives no information that might be of use to interlopers. Several versions of the lost original exist, and wide circulation led to rapid diffusion of the news, and permanent association of the newly discovered islands with the 'Indies.' In the letter there is early reference to Cathay, in relation to Cuba, and indications of optimism:

'When I reached Juana, I followed its coast to the westward, and I found it to be so extensive that I thought it must be the mainland, the province of Catayo. And since there were neither towns nor villages on the seashore, but only small hamlets, with the peoples of which I could not have speech, because they all fled immediately, I went forward on the same course, thinking that I should not fail to find great cities and towns. And at the end of many leagues, seeing that there was no change and that the coast was bearing me northwards, which I wished to avoid, since winter was already beginning and I proposed to make from it to the

south, and as moreover the wind was carrying me forward, I determined not to wait for a change in the weather and retraced my path as far as a certain harbour known to me. And from that point, I sent two men inland to learn if there were a king or great cities. They travelled three days' journey and found an infinity of small hamlets and people without number, but nothing of importance. For this reason they returned.

'. . . I saw another island, distant eighteen leagues from the former, to the east, to which I at once gave the name "Española." And I went there and followed its northern coast, as I had in the case of Juana, to the eastward for one hundred and eighty-eight great leagues in a straight line. This island and all the others are very fertile to a limitless degree, and this island is extremely so. In it there are many harbours on the coast of the sea, beyond comparison with others which I know in Christendom, and many rivers good and large, which is marvellous. Its lands are high, and there are in it very many sierras and very lofty mountains, beyond comparison with the island of Teneriffe. All are most beautiful, of a thousand shapes, and all are accessible and filled with trees of a thousand kinds and tall, and they seem to touch the sky. And I am told that they never lose their foliage, as I can understand, for I saw them as green and as lovely as they are in Spain in May. . . . In the interior are mines of metals, and the population is without number. Española is a marvel.'

Columbus describes the naked Indians as guileless and generous, and amongst these Arawaks, some of whom he took home to Spain, he found no human monstrosities 'as many expected.' Further, 'in this Española, in the situation most convenient and in the best position for the mines of gold and for all intercourse as well with the mainland here as with that there, belonging to the Grand Khan, where will be great trade and gain, I have taken possession of a large town, to which I gave the name Villa de Navidad, and in it I have made fortifications. . . .' He assumes that the forty or so men he left behind will have discovered many useful commodities, in addition to the gold, cotton, spices, mastic, wood and slaves that he could already promise.

On his return the rulers of Castille asked him to report in person, addressing him as 'Admiral of the Ocean Sea and. Viceroy and Governor of the islands that have been discovered

in the Indies.' The claim of Columbus to have reached the eastern fringe of Asia was accepted widely. Peter Martyr, writing on October 1st, 1493, refers to him as having 'sailed to the western antipodes—even to the Indian coast as he himself believes.' As to the islands being adjacent to India, 'although the size of the globe seems to suggest otherwise, I do not wholly deny this, for there are not wanting those who think that the Indian coast is distant from the end of Spain but by a little stretch.' In a letter written a month later Peter Martyr inclines to the view that 'the birds and many other objects brought thence seem to indicate that these islands do belong, be it by proximity or by their products, to India.'[7] By this time Columbus had left on his second voyage.

No less than seventeen ships sailed from Cadiz on September 25th, 1493, and departed from Ferro in the Canaries on October 13th. The coast of Dominica was sighted after twenty days, and, writes Dr. Chanca, physician to the fleet, 'we should have sighted it in fifteen days if the flagship had been as good a sailor as the other vessels, for on many occasions the other ships shortened sail because they were leaving us so far behind . . . during the whole voyage we encountered no storm, except on the eve of St. Simon, when there was one which for four hours put us in great peril.' Although the voyage was comparatively short, great was the delight at reaching land 'for the people were so wearied with bad living and with pumping out water that they all sighed most anxiously for land.'

The contrast of vegetation and climate with that of Spain is again noted—Dominica was 'all very mountainous, very beautiful, and very green down to the water, and this was a delight to see, since in our country at that season there is scarcely any green.' In Guadaloupe evidences were seen of cannibalism; the islands of the dreaded Caribs, who unlike the Arawaks were war-like and predatory, had been reached. The admiral had heard of them on his first voyage and 'had directed his course to discover them, because they were the nearest to Spain and also because from there the route by which to come to the island of Española, where he had left people before, was direct. To those islands, by the goodness of God and by the good judgment of the admiral, we came as directly as if we had

been following a known and accustomed route.' Interestingly enough this became the usual approach route to Española.

The fleet passed on to other islands in the Leeward group, to Puerto Rico, and on to Española, to discover that the settlement at La Navidad had suffered tragic eclipse. With much labour and suffering in the hot humid climate a new town, Isabella, was founded. Lucrative returns to the Spanish investment in the 'enterprise of the Indies' already showed signs of lagging.

In the memorandum sent home with Torres, Columbus reaffirmed his optimism—'say on my behalf to their highnesses that it has pleased God to give me such grace for their service, that up to now I do not find less, nor has less been found, of anything that I have written and said and affirmed to their highnesses in past days. . . . For in the matter of spices . . . such signs and evidence of them have been found, that it is reasonable to expect much better results. And the same in the matter of the mines of gold . . . there have been found so many rivers, so filled with gold. . . .' However, he could but send specimens of gold, owing to sickness due 'to change of water and air,' to the difficult terrain, and lack of beasts of burden. Columbus was to show little aptitude for administration, a factor that played no small part in his later undoing.

On April 24th, 1494, Columbus set out from Española, in the words of the contemporary historian, Bernaldez, 'to discover the mainland of the Indies.' He voyaged with three caravels along the south coast of Cuba, and discovered the island of Jamaica, which yielded no gold, before returning to Isabella in September of the same year.

Bernaldez says of the outset of his travels that he expected to round Cuba and to run 'towards that which he desired, which was to seek the province and city of Catayo, which is under the dominion of the Grand Khan, saying that he could reach it by this route. Of it is read, as John Mandeville says and others who have seen it, that it is the richest province in the world. . . . This province and city lie in the parts of Asia, near the lands of Prester John of the Indies. . . . I say that it must needs take a great space of time to reach it. . . it is my belief that in the direction in which the admiral sought for Catayo,

traversing the firmament of sea and land for a further thousand two hundred leagues, he would not arrive there, and so I told him and gave him to understand in the year 1496 . . . when he was my guest and left with me some of his writings. . . .' Columbus was in fact, on this voyage, anxious to ascertain whether Cuba was in fact part of the continental mainland of Asia; he became convinced that it was, and that he was very near the Golden Chersonese (Malaya).

In March 1496 he left for Spain, to cope with growing misfortunes, and it is commonly held that it was during the two following years that he laboured to show that his tenaciously held beliefs rested on good authority. On May 13th, 1498, he sailed again, leaving San Lucar with six caravels and proceeding via Madeira. From the Canaries three ships sailed direct to Española with supplies but the admiral with the remaining vessels went on to the Cape Verdes before proceeding westwards. Calms delayed the crossing but after twenty-six days Trinidad was reached and contact made with the coast of South America in the Paria region. Columbus arrived at the third and permanent Spanish settlement, Santo Domingo, on August 31st. He despatched from Española on October 18th the famous letter describing his third voyage, in which are to be found some remarkable views on changes experienced after passing a line one hundred leagues west of the Azores, the limit of the Spanish sphere as fixed by papal bull in May 1493. Columbus writes:

'. . . in passing thence to the westward, the ships went rising gently towards the sky, and then the mildest weather was enjoyed, and the needle shifted a quarter of the wind on account of this mildness, and the further we went, the more the needle shifted towards the north-west. . . . And Ptolemy and other wise men who have written of this world believed that it was spherical and that this hemisphere was round as that in which they lived. . . . In that hemisphere, I do not question at all that it is spherical . . . but I declare that this other hemisphere is as the half of a very round pear, which has a raised stalk. . . . Of this half neither Ptolemy nor the others who wrote of the world had knowledge. . . .'

Columbus goes on to argue that the fact that the people of Africa and of the Cape Verdes are black, while those of Trini-

dad are 'of very fair stature and whiter than others who have been seen in the Indies' points to great heat on the one hand and a milder climate on the other, the latter due to the fact 'that the land is the highest in the world, nearest to the sky, as I conceive.' He refers to the astonishing outflow of the fresh waters of the Orinoco in relation to the location of the earthly paradise, to which 'save by the will of God, no man can come.' He holds that 'it is at the summit, there where I have said that the shape of the stalk of the pear is, and that, going towards it from a distance, there is a gradual ascent to it . . . I believe that this water may originate from there, though it be far away . . . I have never read or heard of so great a quantity of fresh water so coming into and near the salt. And the very mild climate also supports this view, and if it does not come from there, from paradise, it seems to be a still greater marvel, for I do not believe that there is known in the world a river so great and so deep.'

In the letter from which we have quoted Columbus mentions increasing disaffection; 'the glory of this conquest and the salvation of souls' are ignored, and there is 'defaming and disparagement of the undertaking . . . because I had not immediately sent caravels laden with gold.' Discontent in the new settlement grew more serious, and he and his brother were sent home in chains in the year 1500. He wrote in that year, 'If it be something new for me to complain of the world, its custom of maltreating me is of very old standing. A thousand battles have I fought with it, and have withstood all until now when neither arms nor wit avail me. With cruelty, it has cast me down to the depth. . . . Of the new heaven and of the new earth, which Our Lord made, as St. John writes in the Apocalypse, after He had spoken of it by the mouth of Isaiah, He made me the messenger and He showed me where to go.' The greater part of this letter, written to the nurse of the young prince Don Juan of Castille, is taken up with bitter personal quarrels and administrative disputes, as well as renewed excuses for the poor returns in gold and other promised sources of wealth.

The fourth voyage was an unofficial venture. Columbus sailed with four ships, taking his son Ferdinand, from Cadiz,

on May 9th, 1502. He proceeded via the Canaries to Martinique, the crossing from Palma taking sixteen days. He had been forbidden to land on Española, and sailed on to the coast of central America, which was for him a peninsula of south-east Asia. From Bonaca island, near Cape Honduras, he skirted the coast eastwards to Cape Gracias a Dios, and south along the 'Mosquito' coast to Veragua (the region today of eastern Costa Rica and northern Panama). There he saw 'greater evidence of gold on the first two days than in Española in four years' and 'lands that could not be more lovely or better cultivated.' He returned via south Cuba to the north coast of Jamaica, where the two ships that remained were grounded and converted into dwellings; a year was spent in involuntary exile before a vessel arrived from Española.

In the letter written from Jamaica on July 7th, 1503, Columbus bitterly narrates his misfortunes, and is full of self pity, writing of poverty and adversity, seeing visions and hearing voices. After his arrival in the West Indies adverse winds and currents, phenomenal storms, and the conditions of his vessels all conspired against him. His geographical conceptions resemble clearly those portrayed by Martin Behaim on his globe. Cuba is still Mangi. He quotes the scriptures in support of his claims to have discovered King Solomon's mines in Veragua. The people of the coast are uncivilised, but further west, he is certain are more advanced people. 'Ciguare' is only nine days west of Veragua and it has gold and fairs and markets, sea all round it, and the Ganges but ten days' journey beyond; he searched for a passage to the west but failed, of course, to find it.

By the time Jamaica was reached the expedition was in sore straits; the faithful Diego Mendez made a canoe voyage to get help from Española, but a year elapsed before the survivors were rescued. Columbus arrived in Spain in November 1504, to die, not in poverty but in obscurity, in 1506, still firmly convinced that the lands he had discovered were on the eastern fringe of Asia. He was unable to see, as so many contemporaries had already realized, that between the new lands and Cathay there remained a gap still to challenge seamen.

[1] For a brief comment, see J. N. L. Baker in *Geographical Journal*, XCVI.
[2] See E. G. Ravenstein, *Martin Behaim, His Life and His Globe*. London, 1908.
[3] E. Prestage, *The Portuguese Pioneers*.
[4] These, and quotations relating to Columbus that follow, are taken from *Select Documents Illustrating the Four Voyages of Columbus*, 2 vols., with introduction by Cecil Jane and E. G. R. Taylor. Hakluyt Society, 1930, 1933.
[5] See S. E. Morison, *Admiral of the Ocean Sea*. Boston, 1942.
[6] G. E. Nunn develops this theme in *Geographical Conceptions of Columbus*. New York, 1924.
[7] Quoted by A. P. Newton in *The Great Age of Discovery*.

5

THE CABOTS: A WESTERN PASSAGE

In this chapter it is proposed to consider the voyages of John Cabot in 1497 and 1498, and the voyage made sometime during the period 1508–09 by his son Sebastian, important enterprises backed by the English. J. A. Williamson has made a valuable study of them in a wide setting, presenting reasoned arguments and the documentary evidence on which they are based.[1] The obscurity that surrounds these early voyages is partly due to the disappointing results, partly to the general lack of interest in England in the geographical problems they raised. E. G. R. Taylor points out that here, after 1497, 'mediæval conceptions remained but little disturbed for half a century.'[2]

John Cabot, citizen of Venice, qualified as such in 1476 by fulfilling the requirement of fifteen years residence, having very probably been born in Genoa. His movements in the twenty years before 1496 are obscure, but he is alleged to have endeavoured to enlist support for his proposal to reach Asia by sailing west, both in Lisbon and Seville, before coming to England, probably between 1484 and 1490. Bristol, the chosen port, not only had connections with Portugal and the Azores but was a centre for trade with Iceland, and in the opinion of Williamson 'the Icelanders of the fifteenth century were well

aware of the existence of what we call North America.' Bristol men had shared, certainly from 1480 on, in the search for islands in the Atlantic. John Cabot was to sponsor a more ambitious scheme based on geographical reasoning, strengthened perhaps by the Icelandic tradition. In the terms of the letters patent granted to him on March 5th, 1496:

'. . . Be it known and made manifest that we have given and granted as by these presents we give and grant, for us and our heirs, to our well-beloved John Cabot, citizen of Venice, and to Lewis, Sebastian and Sancio, sons of the said John, and to the heirs and deputies of them, and of any one of them full and free authority, faculty and power to sail to all parts, regions and coasts of the eastern, western and northern sea, under our banners, flags and ensigns, with five ships or vessels of whatsoever burden and quality they may be, and with so many and such mariners and men as they may wish to take with them in the said ships, at their own proper costs and charges, to find, discover and investigate whatsoever islands, countries, regions or provinces of heathens and infidels, in whatsoever part of the world placed, which before this time were unknown to all Christians. . . . And that the beforementioned John and his sons or their heirs and deputies may conquer, occupy and possess whatsoever such towns, castles, cities and islands by them thus discovered that they may be able to conquer, occupy and possess. . . .'

It is noteworthy that the letters patent reveal avoidance of a southerly route from England, which might impinge on Spanish preserves, but on the other hand regard lands hitherto unknown to Christians as a legitimate objective, wherever they might be. According to the Bristol chronicle of Maurice Toby, written in 1565, John Cabot sailed in the *Matthew* on May 2nd, 1497 and returned on August 6th, having sighted land on June 24th, after fifty-four days' sailing in the zone of the westerlies. The king made a grant of £10 'to him that found the new isle,' and later granted a pension.

Lorenzo Pasqualigo in a letter to his brothers in Venice, wrote on August 23rd:

'That Venetian of ours who went with a small ship from Bristol to find new islands has come back and says he has discovered

mainland 700 leagues away, which is the country of the Grand Khan, and that he coasted it for 300 leagues and landed and did not see any person; but he has brought here to the king certain snares which were spread to take game and a needle for making nets, and he found certain notched [or felled] trees so that by this he judges that there are inhabitants. Being in doubt he returned to his ship; and he has been three months on the voyage; and this is certain. And on the way back he saw two islands, but was unwilling to land, in order not to lose time, as he was in want of provisions. The king here is much pleased at this; and he [Cabot] says that the tides are slack and do not run as they do here. The king has promised him for the spring ten armed ships as he [Cabot] desires. . . . His name is Zuam Talbot and he is called the Great Admiral and vast honour is paid to him and he goes dressed in silk, and these English run after him like mad. . . .'

Another valuable account which throws light on the voyage and on Cabot is contained in a letter written by Raimondo de Soncino to the Duke of Milan, on December 18th of the same year:

'Perhaps amid the numerous occupations of your Excellency, it may not weary you to hear how his Majesty here has gained a part of Asia, without a stroke of the sword. There is in this Kingdom a man of the people, Messer Zoane Caboto by name, of kindly wit and a most expert mariner. Having observed that the sovereigns first of Portugal and then of Spain had occupied unknown islands, he decided to make a similar acquisition for his majesty. After obtaining patents that the effective ownership of what he might find should be his, though reserving the rights of the crown, he committed himself to fortune in a little ship, with eighteen persons. He started from Bristol, a port on the west of this kingdom, passed Ireland, which is still further west, and then bore towards the north, in order to sail to the east, leaving the north on his right hand after some days. After having wandered for some time he at length arrived at the mainland, where he hoisted the royal standard, and took possession for the king here; and after taking certain tokens he returned.

'This Messer Zoane, as a foreigner and a poor man, would not have obtained credence, had it not been that his companions, who are practically all English, and from Bristol, testified that he spoke the truth. This Messer Zoane has the description of the world in a map, and also in a solid sphere, which he has made, and shows

where he has been. . . . They say that the land is excellent and temperate, and they believe that Brazil wood and silk are native there. They assert that the sea there is swarming with fish, which can be taken not only with the net, but in baskets let down with a stone, so that it sinks in the water. I have heard this Messer Zoane state so much.

'These same English, his companions, say that they could bring so many fish that this kingdom would have no further need of Iceland, from which place there comes a very great quantity of the fish called stockfish. But Messer Zoane has set his mind upon even greater things because he proposes to keep along the coast from the place at which he touched, more and more towards the east, until he reaches an island which he calls Cipango, situated in the equinoctial region, where he believes that all the spices of the world have their origin, as well as the jewels. He says that on previous occasions he has been to Mecca, whither spices are borne by caravans from distant countries. When he asked those who brought them what was the place of origin of these spices, they answered that they did not know, but that other caravans came with this merchandise to their homes from distant countries, and these again said that the goods had been brought to them from other remote regions. He therefore reasons that if the easterners declare to the southerners that these things come from places far away from them, and so on from one to the other, always assuming that the earth is round, it follows as a matter of course that the last of all must take them in the north towards the west.

'He tells all this in such a way, and makes everything so plain, that I also feel compelled to believe him. What is much more, his Majesty, who is wise and not prodigal, also gives him some credence. . . . Before very long they say that his Majesty will equip some ships, and in addition he will give them all the malefactors, and they will go to that country and form a colony. By means of this they hope to make London a more important mart for spices than Alexandria. The leading men in this enterprise are from Bristol, and great seamen, and now they know where to go, say that the voyage will not take more than a fortnight, if they have good fortune after leaving Ireland. . . .'

These letters indicate the intention of a second voyage, the Soncino letter its proposed direction. Data available on this venture are meagre in the extreme. The letters patent of February 3rd, 1498, refer to six ships, and to the land and isles

lately found by John Cabot. Other evidence points to five ships actually leaving, probably in May of that year, some laden with merchandise belonging to merchants of Bristol and London, and one ship soon falling out.

There is a presumption that the return voyage was successfully made, but no proof. Williamson argues that the celebrated Spanish Juan de la Cosa map of 1500 shows the result of the two voyages, being based in certain detail on maps made after return in each case. The reader is referred to his ingenious argument for the reasoning that leads to the conclusion that the 1497 voyage led to Cape Breton and the coasts of Nova Scotia, while that of 1498 resulted in coasting as far south as Delaware or perhaps Chesapeake Bay. The fact that the La Cosa map shows the "Mar descubierta por Yngleses' nearer the Spanish Indies than is in fact the case, by placing the latter north of their true position, is held to indicate the deliberate intention of warning off the English. Certainly the voyage was not immediately followed up. Only fishing grounds had been discovered and possibly John Cabot's belief that he had reached Asia had now been dispelled. Whether La Cosa's outline is of eastern Asia or of a new continent remains a matter of dispute.

Of the three sons of John Cabot, Sebastian alone, born probably in the period 1483–86, is a figure of historical importance, albeit something of an enigma. Controversy has centred on his character and his actions. The voyage he claimed to have made to the north-west, to seek a passage to Asia, has been thought by some to be simply a substitution of his father's achievement by his own unfounded pretensions. It is true that as a youth he may have accompanied his father, but Williamson follows Winship in believing that the younger Cabot made the voyage he claimed, and made it sometime in the period 1508–09.

The accounts indirectly derive from Sebastian himself and differ according to whether they date from his period of Spanish service, 1512–48, or later, after his return to England. Peter Martyr wrote in 1515:

'A certain Sebastian Cabot has examined those [frozen coasts], a Venetian by birth but carried by his parents while yet a child

into the island of Britain, they going thither as the habit is of Venetians, who in the pursuit of trade are the guests of all lands. He equipped two ships at his own cost in Britain, and with three hundred men steered first for the north, until even in the month of July he found great icebergs floating in the sea and almost continuous daylight, yet with the land free by the melting of the ice. Wherefore he was obliged, as he says, to turn and make for the west. And he extended his course furthermore to the southward owing to the curve of the coastline, so that his latitude was almost that of the Straits of Gibraltar and he penetrated so far to the west that he had the island of Cuba on his left hand almost in the same longitude with himself. He, as he traversed those coasts, which he called the Bacallaos, says that he found the same flow of the waters to the west, although mild in force, as the Spaniards find in their passage to their southern possessions. Therefore it is not only probable but necessary to conclude that between these two lands hitherto unknown lie great straits which provide a passage for the waters flowing from east to west. . . . Cabot himself called those lands the Bacallaos because in the adjacent sea he found so great a quantity of a certain kind of great fish. . . . He found also the men of those lands clothed in skins and not anywhere devoid of intelligence. He says there are great numbers of bears there, which eat fish. . . . I know Cabot as a familiar friend and sometimes as a guest in my house. . . .'

It is important to note that this narrative was written when Sebastian was actively promoting a search for a western passage in the region of the Gulf of Mexico, in the Spanish sphere, and was not of course interested in acquainting his masters with his belief in a north-west passage. On the other hand, some accounts deriving from after the time of his return to English service give a very different emphasis. We quote from that contained in a work by Richard Willes, published in 1577:

'Well, graunt the West Indies not be continue continent unto the Pole, graunt there be a passage betwyxt these two landes, let the goulph lye neare us than commonly in cardes we fynde it set, namely, betwyxt the 61 and 64 degrees north, as Gemma Frisius in his Mappes and Globes imagineth it, and so left by our countriman Sebastian Cabote, in his table, the which my good Lorde your father [i.e. the Earl of Bedford] hath at Cheynies, and so

tried this laste yeare by your Honours servaunt as hee reporteth, and his carde and compasse doe witnesse . . . that Cabota was not only a skilful seaman, but a long travaler, and such a one as entred personally that steiete, sent by King Henry the seventh to make this aforesaid discovery, as in his owne discourse of navigation you may reade in his carde drawen with his owne hands, the mouth of the northwesterne streict lieth neare the 318 meridian, betwixt 61 and 64 degrees in elevation, continuying the same breadth about 10 degrees west, where it openeth southerly more and more, untyll it come under the tropike of Cancer, and so runneth into Mar de Zur, at the least 18 degrees more in breadth there, then it was where it fyrst began: otherwise I coulde as well imagine this passage to be more unlikely than the voyage to Moscovia, and more impossible then it for the farre situation and continuance thereof in the frosty clime: as nowe I can affyrme it to be very possible. . . .'

This passage occurs in the course of a discussion on the practicability of the discovery of a north-west passage, during the period of the renewed English search for Cathay which began in the second half of the sixteenth century. Let us note that Williamson concludes, after consideration of all the available evidence, that Sebastian Cabot in his voyage to the north-west passed through Hudson Strait to Hudson Bay and was convinced that he had reached the Pacific Ocean. He turned back because of the attitude of his crew, and the prospect of 'floating ice and hardship illimitable,' and his was 'an achievement that places him on a level with Henry Hudson and Luke Fox—nay higher, for he had less previous knowledge to build upon.' After searching the American coast for a strait, south to 38° North, with no success, he returned to England to find 'Henry VII dead, and the air thick with spirited foreign policies and rumours of war.'

Later English projects launched towards the north-west, in 1527 and 1536, failed also, so that efforts were directed to the north-east, beginning with the Willoughby and Chancellor expedition of 1553, when Sebastian had returned to England, and there was vigorous interest in exploration to seek trade outlets. It was not until 1576 that Martin Frobisher made a voyage to the north-west, and again put the convictions of Sebastian Cabot, and of others, to the test.

[1] J. A. Williamson, *The Voyages of the Cabots and the English Discovery of North America under Henry VII and Henry VIII*, 1929. Quotations are from this source, by courtesy of the Argonaut Press.
[2] E. G. R. Taylor, *Tudor Geography*, 1485-1583, London, 1930.

6

NORTH-EAST PASSAGE TO CATHAY

The phase of exploration towards the north that began in the mid-sixteenth century was concerned with regions which were not entirely unknown to Europeans, and not merely as a result of those sporadic sailings to the north-west that we have already noted. Centuries earlier, Norse seamen had become acquainted not only with North American territory and with Greenland and Iceland, but with Novaya Zemlya and Spitsbergen and the Arctic coasts of Europe. The degree to which other Europeans became aware of the northern lands is obscure, but for the English, there is some evidence of contacts with Greenland.

The anonymous *Inventio Fortunatae* of the late fourteenth century would seem to be in part based on such contacts, although it incorporates also legendary ideas of colonisation by the ancient British king Arthur, of the sixth century. This work exercised considerable influence on ideas about the north polar regions both in England and on the continent, and led to Mercator, in his map of 1569, depicting the polar passages as existing, but presenting great difficulties. The *Fortunatae* account has been described as presenting 'a schematisation of the most striking features of far northern lands in general—the intricate channels, the dreaded races and whirlpools, the lofty, forbidding, bare cliffs, and the magnetic pole.' This was 'in harmony with early Cosmological notions which placed the seat of the winds and tides at the Pole.'[1]

We must notice that explorers were influenced, as also were theorists, by what purported to be the exploits of some Venetians in the north, in the late fourteenth century. In

Richard Hakluyt's *Voyages* is to be found a document with the cumbersome title—'*The Discoverie of the Isles of Frisland, Iseland, Engroneland, Estotiland, Drogeo and Icaria: made by two brethren, namely M. Nicholas Zeno, and M. Antonio his brother: Gathered out of their letters by M. Francisco Marcolino.*' The original account, together with a map, was first published in Venice in 1558 and had a wide circulation, readily understood in view of its fascination. It is largely fictitious, although doubtless some elements in it derive indirectly from facts.

The alleged Zeni discoveries began in 1380 when Nicholas was sailing to England and Flanders, impelled to travel by the desire 'to see the fashions of the worlde . . . and acquaint himself with the manners of sundry nations and learn their languages.' He was 'so tossed for the space of many dayes, with the sea and the wind, that he knew not where he was . . . the ship was cast away upon the Isle of Friseland.' A prince Zichmni, with strong humanitarian impulses and with armed followers, addressed him in Latin and this was the prelude to a sequence of remarkable experiences.

Hakluyt notes that the Historie 'for some fewe respects may perhaps be called in question' but is encouraged by the acceptance of the story by Abraham Ortelius. The learned Welshman John Dee believed that Friseland and Estotiland had been colonised in the time of King Arthur and made this the basis for a British claim to some northern lands in his day.

The repeated attempts made to find a northern passage to Cathay from the mid-sixteenth century to the third decade of the seventeenth century, were the result of interest in finding a short route, and one not endangered by Portuguese or Spanish claims. The English and the Dutch took the lead, but there was some Danish interest, Captain Jen Munk for example sailing to the Hudson Bay region in 1614. The north-eastern route to Cathay eastwards from North Cape in Norway, and the north-western from the entry between Greenland and Labrador, were the scene of a number of efforts. The voyages to the north-east began with that of Sir Hugh Willoughby and Richard Chancellor in 1553, and closed with the cessation of Dutch efforts in 1624. The first voyage to the north-west in this

series was made by Martin Frobisher in 1576, and the close came with the efforts of Foxe and James in 1631.

In some degree these efforts were interdependent, opinion sometimes favouring one, sometimes the other route. Some mariners, notably Henry Hudson, participated in both. It was not of course until much later, when the interest had ceased to be utilitarian, that sailing through the passages was achieved. Amundsen made his way in the *Gjöa* from the Atlantic to the Pacific through the Canadian archipelago in 1903–05, A. E. Nordenskiöld reached Japan via the north of Eurasia in the *Vega* in 1878–79.

The voyages to the north-east began, in the main, with the English desire, in a period of economic depression, to find markets for manufactures, as well as valuable return cargoes. A striking plan to reach Cathay by direct sailing to the north across polar seas had been put forward earlier but had found no response. This was the scheme advanced, in an address to Henry VIII made in about 1530, by Robert Thorne, an English merchant who had lived in Seville. It was later printed by Roger Barlow in the *Briefe Summe of Geographie*, in 1541.

Barlow had accompanied Sebastian Cabot to the Plate estuary in 1526, on an expedition in which Robert Thorne had invested money. The secret intention of these Englishmen was 'to study the navigation and navigating charts of Far Eastern waters, and to inquire about the seas north and north-east of the Moluccas, that is towards the "backside" of the New Found Land.'[2] Barlow's work was a translation of the *Suma de Geographie* of Fernam de Enciso, published in Seville in 1519. Towards the close of the book he wrote:

'Ther resteth this waie of the northe onelie for to discover which resteth onto your graces charge, for that the situation of this realme toward that partie is more apte for it then eny other, and also for that your grace hath takyn farre enterprise to discover this part of the world already, and suche an enterprise ought not to be left of . . . as for iopardes and parells, this waie of navigation well considered and pondred shall seme moche lesse perill then all the other navigations. . . .'[3]

A notable voyage directly to the north was not in fact made until Henry Hudson sailed in May 1607 for the Muscovy Co.,

to seek 'a Passage by the North Pole to Japan and China.' Proceeding to the east of Greenland he reached Spitsbergen; he was checked by ice in about 81° N. and a stimulus to whale fishery was the only practical outcome.

The outburst of English enthusiasm for discovery that began shortly before Willoughby and Chancellor sailed in 1553 found some expression in literature. We have already had need to refer to Hakluyt and Purchas, and it will be appropriate at this juncture to note some features of their work, and that of their forerunners. The 'pioneers of the English geographical renaissance' were Richard Eden and John Dee.

Eden's *Treatise of the Newe India*, a translation of part of Sebastian Munster's *Cosmography*, appeared in 1553 and was dedicated to the Duke of Northumberland, promoter of the voyage to the north-east made in that year. His translation of the *Decades of the newe worlde or west India*, the work of Peter Martyr of Angheria, in 1555, which included passages from other authors also, made available for English readers a valuable and classic history of discovery. A friend of Sebastian Cabot and Richard Chancellor, for some years Eden acted as chronicler to the Muscovy Company; in 1561 he published *The Art of Navigation*, a translation of a Spanish work by Martin Cortes.

John Dee was educated at Cambridge and Louvain and was a mathematician and astrologer, keenly interested in cosmography, and in the art of navigation. Over a period of some thirty years, until his flight to Bohemia in 1583, he acted as instructor in navigation to pioneers sailing to the north. Dee was an exponent of overseas expansion influential at court; much of his interest in the routes to Cathay derived, however, from his interest in finding the elixir of life, and the philosopher's stone, and it was pursuit of the occult that led to his flight. He was, however, in contact for many years with the leading continental thinkers who were interpreting the new discoveries in books, maps and globes—Gemma Phrysius, Orontius Finaeus, Gerard Mercator and Abraham Ortelius.

The more famous of the Hakluyts is usually designated Richard Hakluyt of Oxford, or the preacher, or the younger, to distinguish him from the older Richard Hakluyt, the lawyer,

of the Middle Temple. The elder Hakluyt (1535?–1591) was active for some years after his younger cousin (1551–1616) had commenced his career. Both were interested in trade and commerce, and in English expansion by means of plantations in the New World, but the lawyer had more limited influence and was essentially an economic consultant to planners of expeditions. It was he who started the younger man on his unique career; the following classic passage occurs in the dedication to Sir Francis Walsingham of the first edition of the famous *Voyages*, that of 1589:

'I do remember that being a youth, and one of her Majesties scholars at Westminster that fruitfull nerserie, it was my happe to visit the chamber of M. Richard Hakluyt my cosin, a Gentleman of the Middle Temple, well known unto you, at a time when I found lying open upon his boord certeine bookes of Cosmographie, with an universall Mappe: he seeing me somewhat curieus in the view thereof, began to instruct my ignorance, by shewing me the division of the earth into three parts after the olde account, and then according to the latter and better distribution, into more: he pointed with his wand to all the knowen Seas, Gulfs, Bayes, Straights, Capes, Rivers, Empires, Kingdomes, Dukedomes, and Territories of ech part, with declaration also of their speciall commodities, and particular wants, which by the benefit of traffike, and intercourse of merchants, are plentifully supplied. From the Mappe he brought me to the Bible, and turning to the 107 Psalme, directed mee to the 23 and 24 verses, where I read, that they which go downe to the sea in ships, and occupy by the great waters, they see the works of the Lord, and his woonders in the deepe &c. Which words of the Prophet together with my cousins discourse (things of high and rare delight to my young nature) tooke in me so deepe an impression, that I constantly resolved, if ever I were preferred to the University, where better time, and more convenient place might be ministred for these studies, I would by Gods assistance prosecute that knowledge and kinde of literature, the doores whereof (after a sort) were so happily opened before me.'

After leaving Oxford, and obtaining an income from clerical duties that were not onerous, Hakluyt steadily increased his reputation as an authority on overseas enterprise, making numerous contacts with both theorists and men of

action. The *Divers Voyages to America* appeared in 1582, and Hakluyt then went to Paris for some years, as chaplain to the embassy. He returned with a determination to dispel the obscurity that surrounded English maritime efforts. The English horizon had widened with the voyages of Drake and Cavendish, and the defeat of the Armada; there was a story to unfold and a public demand for enlightenment. This great Elizabethan expressed the spirit of his times, in 1589, in *The principall Navigations, Voiages and Discoueries of the English nation, made by Sea or over Land, in the most remote and farthest distant Quarters of the earth at any time within the compasse of these* 1500 *yeeres.*

In the enlarged edition that appeared in the years 1598–1600 Hakluyt added some accounts of foreign voyages to fill gaps in his exposition of the knowledge of the world. The arrangement of material was essentially the same, the major headings being voyages to the north and north-east, to the south and south-east, and to America. Thus we have a source book for the historian and the geographer; a fascinating collection of narratives that for some decades was to have practical value, and since the early nineteenth century, after a long period of neglect, to enjoy great popularity with all those interested in discovery.

Samuel Purchas (1577–1626) was a lesser figure in a less heroic age. He showed keen interest in travel and exploration while still a student at Cambridge, came to be a great admirer of Hakluyt, and followed in his footsteps. Showing enormous energy, he collected narratives, and was the friend of many seamen, including Bylot and Baffin. In 1612 appeared *Purchas his Pilgrimage*, which surveyed the world from the angle of its peoples and their religion. E. G. R. Taylor sums up his better known and later work, *Hakluytus Posthumus or Purchas his Pilgrimes*, of 1625:

'a double though a gallant failure. It was neither an authentic collection of well-edited historical documents speaking for themselves, nor a geographical history of the world; nevertheless, it has served to preserve much that would inevitably have been lost had it never been written. . . .'[4]

Having noted the rôle of Hakluyt and Purchas we must now revert to the first explorers towards the north-east, in search of Cathay.

Willoughby and Chancellor sailed on May 10th, 1553 with three vessels, the *Bona Esperanza, Bona Confidentia* and *Edward Bonaventure*, from the Thames, on behalf 'of the mysterie and companie of the Marchants adventurers for the discoverie of Regions, Dominions, Islands and places unknowen'; they were 'resolved upon a newe and strange Navigation.' The ships departed from Radcliffe, and 'being come neere to Greenewich, (where the Court then lay) presently upon the newes thereof, the Courtiers came running out, and the common people flockt together, standing very thicke upon the shoare: the privie Counsel, they lookt out at the windowes of the Court, and the rest ranne up to the toopes of the towers: the shippes hereupon discharge their Ordinance and shoot off their pieces after the manner of warre, and of the sea . . . and the Mariners, they shouted in such sort, that the skie rang againe with the noyse thereof. . . .'

Thus with a boisterous departure the ships sailed for the north. They were provided with 'letters missive, which the right noble Prince Edward the sixt sent to the Kings, Princes, and other Potentates, inhabiting the Northeast partes of the worlde, toward the mighty Empire of Cathay. . . .' These set forth the general blessings of trade and intercourse, and desire kings and princes 'to permit unto these our servants free passage. . . . Consider you that they also are men. If therefore they stand in neede of anything, we desire you . . . to ayde and helpe them. . . .'

For the conduct of the voyage Sebastian Cabot, Governor of the Company, had drawn up elaborate instructions on the importance of harmony, obedience, of keeping a record of navigation; of avoiding blaspheming and swearing, of clean habits, of care of the merchandise; of not disclosing to 'any nation the state of our religion,' of being civil and courteous to strangers; of not being afraid of men clad in 'Lyons or Beares skinnes, having long bowes, and arrowes'; of the danger of naked cannibals attacking the ships from 'some islands'—and of many other matters.

Willoughby and Chancellor became separated by a storm, Willoughby eventually reaching Lapland, and attempting to winter in a desolate region, he and his company were later found frozen to death. Chancellor in the *Edward Bonaventure* waited at the pre-arranged rendezvous, 'Wardhouse' (Vardo), for seven days, with his company 'very pensive, heavie, and sorrowful' and then went on with his mission. He came 'at last to the place where hee found no night at all, but a continuall light and brightnesse of the Sunne shining clearely upon the huge and mighty sea. And having the benefite of this perpetuall light for certaine days, at the length it pleased God to bring them into a certaine great Bay. . . .' Chancellor had discovered a sea route to Russia, and landed near the mouth of the Dvina, after entering the White Sea. His care in making friendly contacts with the Russians led to an invitation to visit the Tsar, Ivan IV, in Moscow, and the Englishman made the 'long and most troublesome' journey, 'wherein hee had the use of certaine sleds, which in that Countrey are very common . . . the people almost not knowing any other maner of carriage, the cause whereof is the exceeding hardnesse of the ground congealed in the winter time by the force of the colde, which in these places is very extreme and horrible. . . .'

After a successful journey Chancellor returned by the same route in 1554. A new company, which came to be called the Russia or Muscovy Company, was formed in the following year, with a monopoly of operations in the north-east, north and north-west. On April 23rd, 1556, Stephen Burrough sailed in the pinnace *Serchthrift* for 'discoverie toward the river of Ob,' the 'good olde Gentleman Master Cabota' being at the convivial leave taking at Gravesend: moreover 'for very joy that he had to see the towardness of our intended discovery, he entred into the dance himselfe. . . .' Burrough reached the mouth of the Pechora river, and Vaigats (Vaygach) island but further progress was checked by 'great and terrible abundance of ice . . . and we doubt greater store abideth in those parts'; moreover winter was coming on, and continual north-east and north winds were encountered.

In the years that followed the efforts of the Muscovy Company were directed towards trade with Russia, and to possible

overland routes for the traffic of Cathay. Fascinating travels resulted, such as those of Anthony Jenkinson from the White Sea to the Caspian, and to Bokhara, and there were those who were restive at the absence of search by sea. Jenkinson himself wished to sail for the north-east passage, but the only outcome was a debate, in the winter of 1565–66 before the Queen and the Privy Council, on the merits of the north-west as against those of the north-east route. Humphrey Gilbert supporting the former, Jenkinson marshalling arguments for the latter. It was not until 1580 that the expedition of Pet and Jackman was launched. Hakluyt published several documents bearing on it which are of great interest.

The commission was given by the 'company of English Merchants, for discovery of new trades,' to Arthur Pet of the 'goode barke, called the *George* of London, of the burthen of 40 tunnes, or thereabouts' and to Charles Jackman of the 'goode barke, called the *William* of London, of the burden of 20 tunnes, or thereabouts.' In addition 'nine men and a boy' were hired for the *George*, and 'five men and a boy' for the *William*. Such vessels were hired 'for search and discoveries of a passage by sea from hence by Boroughs streights and the Island Vaigats, Eastwards, to the countreis or dominions of the mightie Prince, the Emperour of Cathay, and in the same unto the Cities of Cambalu and Quinsay, or to either of them.'

Provision was made for various possibilities, and despite the 'authoritie of writers and great reason' which underlies the project, the contingency 'that the land of Asia, from beyond the river Ob, extende itself Northwards to 80 degrees, or nearer the poole,' giving no hope of a sea route to Cathay, was provided for; the winter should then be passed if possible in the river Ob, and barter with the 'Samoeds, Yowgorians, or Molgomzes' be carried on. Then perhaps the river could be followed, in the following summer, and 'happely you may come to the citie Siberia, or to some other towne. . . .'

Pet and Jackman received 'instruction and notes' from William Burrough, relating mainly to navigation. Latitude was to be observed as often as possible, and 'also the variation of the Compasse. . . .' A record was to be kept of tides and currents, of coastal features, and 'withall you may not forget

to note as much as you can learn, understand or perceive of the maner of the soil or fruitfulness of every place or countrey you shall come in, and of the maner, shape attire and disposition of the people, and of the commodities they have. . . .'

Further the captains were given 'Certaine briefe advises' by Master Dee. He was of the opinion that 'from Wardhouse to Tabin, the course may bee sailed easily in sixe and thirtie dayes' and from there the coast will run south and east towards Cathay. This was a view derived indirectly from Abulfeda, the mediæval Arabian geographer, and was unorthodox.

In a letter written from Duisburg, by Gerard Mercator to the younger Richard Hakluyt shortly after the vessels had sailed, apparently in answer to a query based on doubts of the views of John Dee, Mercator laments that it is too late for him to give some advice on 'some speciall points.' He writes, the 'voyage to Cathaio by the East, is doutlesse very easie and short, and I have often marvelled, that being so happily begun, it hath been left of, and the course changed into the West, after more than halfe of your voiage was discovered. For beyond the Island of Vaigats and Nova Zembla, there followeth presently a great Baie, which on the left side is enclosed with the mightie promontorie Tabin. Into the mids hereof there fall great rivers, which passing through the whole countrey of Serica, and being as I thinke navigable with great vessels into ye heart of the continent, may be an easie means whereby to traffique for all maner of merchandise, and transport them out of Cathaio, Mangi, Mien, and other kingdoms thereabouts into England.'

Mercator, unlike Dee, believed that Tabin was a 'huge promontorie.' He was persuaded of this 'not onely out of Plinie, but also other writers, and some Maps (though somewhat rudely drawen).' Mercator thinks that the 'pole of the Loadstone is not farre beyond Tabin . . . about which pole and Tabin I thinke there are very many rocks, and very hard and dangerous sailing: and yet a more hard and difficile passage I thinke it to bee this way which is now attempted by the West, for it is nearer to the pole of the Loadstone. . . .'

Pet and Jackman received, before they left, 'notes in writing, besides more privie by mouth' from the elder Richard

Hakluyt. Much of the information relates to very practical matters, to the need for finding trade outlets for cloth, to the articles that should be taken 'for a show of our commodities to be made'—they are to take only 'those things that be in perfection of goodness,' in order to build up reputation for quality. Hakluyt considers it desirable 'to seeke out some small Island in the Scithian sea, where we might plant, fortifie, and staple safely'; then 'wee might allure the Northeast navie, the navie of Cambalu to resort with their commodities to us there planted. . . .' He enjoins strict secrecy if a strait be found, 'that other Princes prevent us not of the same.' The map of England 'set out in faire colours, one of the biggest sort,' and the map of London, should be taken; and 'if you take Ortelius booke of Mappes with you to marke all these Regions, it were not amisse; and if need were, to present the same to the great Can, for it would be to a Prince of marveilous account.' Moreover, 'if you arrive at Cambalu or Quinsay, . . . bring thence the mappe of that countrey, for so shall you have the perfect description. . . .'

The *George* and the *William* left Harwich on May 30th, 1580, and lost contact before reaching 'Wardhouse.' Pet, in the *George*, skirted the west coast of Nova Zemlya, but failed to pass through the passage between Vaygach Island and the mainland. Ice often impeded progress, but Pet and Jackman were elated at meeting off Vaygach, and in company tried sailing north to find a passage. Ice prevented any success, and later the vessels became separated in fog. Eventually, 'the *William* with Charles Jackman arrived at a port in Norway between Tronden and Rostock in October 1580 and there did winter: and from thence departed againe in Februarie following, and went in company of a ship of the King of Denmarke towards Island: and since that time he was never heard of.' Pet arrived safely back in the Thames on September 26th.

The efforts of Pet and Jackman were not followed by an outstanding English voyage to the north-east until Henry Hudson sailed in 1608. In the intermediate period the lead passed to the Dutch, who were taking the initiative in maritime matters and seeking eastern trade, as well as trade with Russia. They were looked upon as 'the acknowledged masters of "Sea

Causes," ' and were in the van of cartographic progress. Peter Plancius, a leading figure in the promotion of voyages to the north-east, was regarded by the English as an authority on navigation problems.

The Dutch established a post at Kola as early as 1565, and Brunel made important journeys overland, and by sea, before Barent's voyages took place in three successive years, commencing in 1594. William Barents (Barentszoon) commanded the *Mercury*, one of the four ships that sailed on the expedition of June 6th–September 16th, 1594, an expedition with which the celebrated trade agent Linschoten sailed; he had resided for some time in the East Indies.

Linschoten's report was encouraging, and in the next year a further effort was made (June 18th–November 18th). In this expedition seven ships participated, commanded by Cornelius Nai; Barents commanded the *Greyhound* and was chief pilot.

The third voyage (May 10th, 1596–November 1st, 1597), was made by two vessels only, Barents being pilot under the command of Jacob van Heemskerk. The expeditions of 1594 and 1595 were promoted by the Dutch States-General and Prince Maurice; the third by 'the rich towne of Amsterdam.' The first expedition led to search of the west coast of Novaya Zemlya and but slight penetration into the Kara Sea, the second met unusually severe ice conditions in Yugor Strait between Vaygach and the mainland, and failed to pass through. The third voyage led to contact with Bear Island (then known as Cherie Island to the English), Spitsbergen (New Land), and the west and north-east coasts of Novaya Zemlya. An Arctic winter was endured in the latter region, and Barents died on the return journey.

Gerat de Veer participated in the last two of Barents's voyages, and his account of all three is of great interest. Purchas abbreviated the translation that he published 'to avoid prolixitie,' an unfortunate practice to which he was given. De Veer sums up the failure as due to ice barriers, shortness of time available in the Arctic summer, and 'bad crosses'; especially the 'Ice that we found about Nova Zemlya under 73, 74, 75 and 76 degrees; and not so much upon the Sea between both the lands; whereby it appeareth, that not the neerenesse

of the North pole, but the Ice that commeth in and out from the Tartarian Sea, about Nova Zembla, causes us to feel the greatest cold.'

De Veer writes of the second voyage that not only discovery of the passage, but also the sale of merchandise 'in such places as they should arrive,' was envisaged. 'Peter Plantius, a learned cosmographer, being a great furtherer and setter forward of this voyage, . . . was their chief instructor therein, setting down the scituation of the Coasts of Tartaria, Cathaia, and China; but how they lye it is not yet sufficiently Discovered, for that the courses and rules by him set downe, were not fully effected by meanes of some inconveniences that fell out, which by reason of the shortnesse of time could not bee holpen.'

The section of the narrative that describes the wintering on the third voyage is appropriately headed—'Their cold comfortless, dark and dreadful Winter: the Sunnes absence, Moones light, Sunnes unexpected return with miraculous speed. Of Beares, Foxes, and many many Wonders.' The crew wintered in a structure built of driftwood, when it became clear that their ship was hopelessly fast in ice on the north-east coast of Nova Zemlya; their sojourn lasted ten months and the fifteen survivors left on June 14th, 1597—'in the end, the time passing away and our victuals beginning to faile us, we were forced for the saving of our owne lives, to leave the ship, and to sayle away in our open Boats, and so to commit ourselves unto the hands of God.'

Later, 'The twentieth, Claes Adrianson and William Barents died, the death of William Barents put us in no small discomfort, as being the chiefe Guide, and onely Pilot on whom wee reposed our selves, next under God.' It was not until July 28th that the mariners, following the west coast of Nova Zemlya, fell in with Russians to the south and were befriended. Later, they were able to consume quantities of 'Leple' leaves which relieved their scurvy. The Russian coast was followed to Kola, where a Dutch vessel was encountered. Ultimately, the survivors entered the Maas and reaching Amsterdam created a sensation—we are told that they were dressed as in Nova Zemlya, their caps 'furr'd with white Foxes Skinnes.'

The voyage made by Henry Hudson for the Muscovy Company, April 22nd–August 26th, 1608, made it clear that ice blocked any way to the north-east between Spitsbergen and Nova Zemlya, and he failed to find a way through to the Kara Sea from the west coast of the latter island. His next voyage, in 1609, was made for the Dutch East India Company; starting his search in the Vaygach island area and being frustrated by ice, he proceeded to the North American coast, and examined it closely between the Nova Scotia region and 35° N. Further efforts by English, Dutch and Danish seamen down to 1624, together with the earlier endeavours, only demonstrated that the southern and eastern borders of the Barents Sea were exceptional, in being ice-free in the short Arctic summer. The influence of the warm water extensions of the North Atlantic drift is confined largely to the coasts of the mainland as far as Vaygach Island, to the west of Novaya Zemlya, Bear Island and the west of Spitsbergen.

Much was learned in this period of exploration of climatic conditions, and of the manner of living of peoples on the fringe of the Arctic; of bears, walrus, seals, deer, etc. It was, above all, the whale that was to lure the adventurous to northern waters. Russian expansion eastwards into Siberia led to exploration of much of the north coast of Asia, in stages, during the seventeenth and the first half of the eighteenth centuries, but a route to Cathay was not the motive. The northernmost cape, named after its explorer, Chelyuskin, was reached in 1742.

[1] See A. P. Newton (editor), *The Great Age of Discovery*, Chapter IX, E. G. R. Taylor, 'The Northern Passages.'

[2] E. G. R. Taylor, *Tudor Geography*. The author is heavily indebted to Professor Taylor's volumes.

[3] *A Brief Summe of Geographie*, by Roger Barlow. Edited by E. G. R. Taylor. Hakluyt Society, London, 1931.

[4] E. G. R. Taylor, *Late Tudor and Early Stuart Geography*, 1583-1650. London, 1934. For useful short essays on Hakluyt and Purchas, by J. A. Williamson and Sir William Foster respectively, consult *Richard Hakluyt and His Successors*, edited E. Lynam, the centenary commemoration volume of the Hakluyt Society, London, 1946. Our quotations are from the MacLehose editions of Hakluyt and Purchas.

7

NORTH-WEST PASSAGE TO CATHAY

Although the first voyage of the series directed to the north-west was not made until Martin Frobisher sailed in 1576, the Humphrey Gilbert project of 1566 having been checked by opposition from the Muscovy Company, the north-western approach was favoured by some at an earlier date.

Theoretical support was forthcoming from Gemma Phyrsius, who made a globe in 1537, which, while it portrayed no strait in the north-east, depicted in the north-west the 'Strait of the Three Brethren,' perhaps a distorted representation of the achievements of the Corte Reals. The strait was shown in about 65° N., and this concept was adopted by Sebastian Munster in his world map of 1540. Gerard Mercator showed an arctic strait in the north-west in his world map of 1538 and his globe of 1541. His world map of 1569 was also favourable, showing the Strait of Anian in the north-west and the discouraging Cape Tabin in the north-east. The world map made by Ortelius in 1564 showed the Cartier discovery of the Gulf of the St. Lawrence as indicating the entry to the north-west passage, and his *Theatrum Orbis Terrarum* of 1570 was likewise helpful. However, there was no unanimity amongst cartographers. The French cartographer, Orontius Finaeus, showed no strait either in the north-west or in the north-east.[1]

Hakluyt printed the most celebrated argument for the existence of a north-west passage, namely, Sir Humphrey Gilbert's *Discourse to prove a passage by the Northwest to Cathaia and the East Indies*; first published, together with a map of the world, in 1577, although largely written in 1566. Richard Willes was another contributor to the controversy; in his *History of Travayle in the West and East Indies*, published

in 1577, he makes some reference to Frobisher's first voyage to the north-west in 1576.

To Gilbert, America is but Atlantis, the submerged continent of classical tradition, once more emerged from the ocean, and like it, circumnavigable. A north-west strait separates America from the tripartite land mass of Europe, Asia and Africa. He cites many authors in support of his views, showing a lack of discrimination. They include Plato, Aristotle and 'all the best moderne Geographers,' amongst them Gemma Frisius, Munster, Apian, Gastaldi, Peter Martyr, and 'also Ortelius, who doth coast out in his ganeral Mappe set out Anno 1569, all the countreys and Capes, on the Northwest side of America . . . making both Gronland and America, Islands disjoyned by a great sea from any part of Asia.' The best geographers support his view, he argues, and it is 'by the rest not denied but left as a matter doubtfull.' No 'civill' men from Cathay have been encountered in America, the animals do not resemble those of Asia—powerful arguments, he thinks, against a land connection.

Moreover, Sebastian Cabot had found the entry to the strait; the 'Three Brethren' had sailed right through it; and he had been told that 'a Frier of Mexico, called Andrew Urdaneta, . . . came from Mar del Sur into Germany through the Northwest passage.' Salvaterra, a Spaniard, related the latter story in Gilbert's presence, in Ireland, in 1568, as happening more than eight years earlier. Salvaterra had seen Urdaneta's 'Sea Card . . . wherein was plainly set downe and described this Northwest passage, agreeing in all points with Ortelius mappe.' Gilbert argued further that 'Indians,' quite certainly Asiatics in his view, had arrived on the coast of Germany, in classical times, according to Pliny and Cornelius Nepos (57 B.C.); and again in A.D. 1160; and he convinced himself that they could only have arrived by sailing through the north-west passage.

We find in Gilbert's *Discourse* reference to an ocean current argument that involves the notion of a continuous circulation round the world from east to west. The current, he writes, enters the Atlantic Ocean by the Cape of Good Hope, and he discusses its outlet, assuming that there is no passage to the

north-east, but only a gulf. He summarises the argument thus:

'Wherefore, this current being proved to come from C. de buona Speranca to the stret of Magellan, and wanting sufficient entrance there, by narrownes of the straite, is by the necessitie of natures force, brought to Terra de Labrador, where Jaques Cartier met the same, and thence certainly knowen, not to strike over upon Island, Lappia, etc. and found by Bernard de la Torre in Mar del Sur, on the backside of America: therefore this current (having none other passage) must of necessity, fall out thorow this our stret into Mar del Sur, and so trending by the Moluccae, China, and C. de buona Speranca, maintaineth it selfe by circular motion, which is all one in nature, with Motus ab Oriente in Occidentum.'

The outcome of Gilbert's arguments was the conviction that a commodious passage to the north-west existed between 62° and 72° N., and that it was at all times navigable: 'you may . . . saile thither with all Easterly windes, and returne with any Westerly windes.' Hakluyt prints, immediately following the *Discourse*, *'Certaine other reasons, or arguments to proove a passage by the Northwest, learnedly written by M. Richard Willes Gentleman.'* Presenting the case for and against, he sums up in a sentence for the opposition to the 'learned and valiant knight'—'the way is dangerous, the passage doubtfull, the voiage not thoroughly knowen, and therefore gainesaid by many. . . .' He concludes:

'it must be Peregrinationis historia, that is, true reportes of skilfull travailers, as Ptolomie writeth, that in such controversies of Geographie must put us out of doubt.'

The Frobisher voyage of 1576 was based on a licence granted, under pressure from the Queen, by the Muscovy Company, and much of the financial backing was provided by Michael Lok. Sir Martin Frobisher had sailed along the Guinea coast and proved well qualified to lead a hazardous venture. He had the benefit of advice from John Dee, including instruction on cosmography and navigation, but E. G. R. Taylor finds indications that he, and Christopher Hall, who sailed with him, had too scanty a knowledge of mathematics to profit

by this—'the elaborate furniture of instruments which had been provided for the voyage, together with a goodly number of maps and charts and a library of books . . . was likely to be of little use.'

Michael Lok had himself made 'many years study' of the passage problem. The wealth of China, India, etc., are described, he wrote, in 'every boke of history and cosmography,' and are alluring enough; but 'if it should happen those new Landes to stretch to the North Pole, so that we could not have passage by Sea that way which we sought to the north-westward . . . yet in those same new lands . . . might be established the like Trade Of Merchandize as is now . . .' with Lappa, Russia, Muscovia, etc., i.e. trade in 'furres, hydes, wax, tallow, oyle.' Richard Hakluyt the elder provided Frobisher with notes which show his preoccupation with colonisation rather than Cathay trade. He asks for reports of climate, on the possibility of growing a variety of crops ranging from oranges to potatoes, on settlement conditions—'bring in your returne a perfect note of the soile.' Hakluyt's *Voyages* gave considerable space to accounts of all three Frobisher expeditions and we shall quote from them.

The *Gabriel* and the *Michael*, each of about thirty tons, and a pinnace of ten tons burden, sailed from the Thames on June 12th. They 'bare downe by the Court, where we shotte off our ordinance and made the best shew we could; Her Majestie beholding the same, commended it, and bade us farewell, with shaking her hand at us out of the window.' The pinnace foundered off Greenland, which was reached on July 11th, and was identified with the island of Friseland, with 'great store of ice' along the coast, and 'great mists.' Later, the *Michael* 'mistrusting the matter,' deserted, returning home, with the report that Frobisher was 'cast away.' Thus, Frobisher with the *Gabriel* alone went on to find the entry to what is now called Frobisher Bay, in Baffin Island, and mistake it for a strait—'that land upon his right hand as he sailed westward he judged to be the continent of Asia, and there to be divided from the firme of America, which lieth upon the left hand over against the same.'

Eskimos were soon encountered in the area. In Hall's

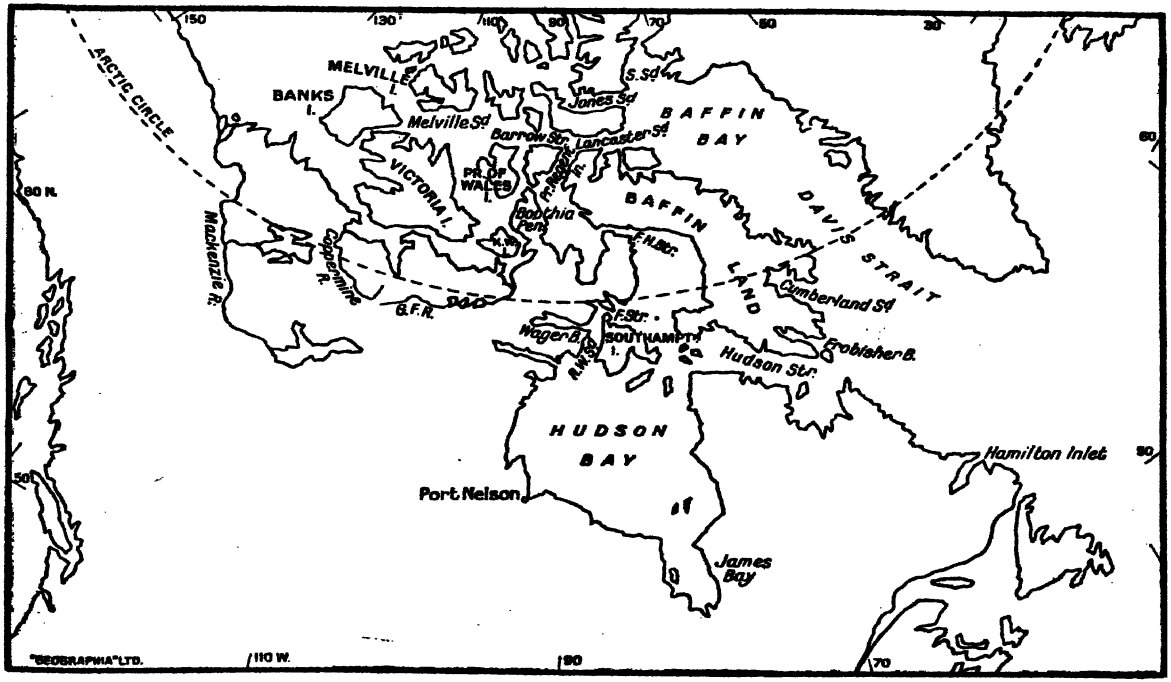

Fig. 6. North-west Passage region. (F. Str.—Frozen Strait. F.H. Str.—Fury and Hecla Strait. G.F.R.—Great Fish River. K.W.I.—King William Island. R.W.Sd.—Roe's Welcome Sound. S.Sd.—Smith Sound.)

words: 'They bee like to Tartars, with long blacke haire, broad faces, and flatte noses, and tawnie in colour, wearing Seale skinnes, and so doe the women, not differing in fashion but the women are marked in the face with blewe streekes down the cheekes, and round about the eyes.' They proved very susceptible to the lure of bells and mirrors, and there was some barter; five seamen were 'intercepted with their boat' and never seen again. An Eskimo was seized and brought back to England, a 'strange infidell, whose like was never seene, read, nor heard of before, and whose language was neither knowen nor understood of any.' He died, later, 'of cold which he had taken at sea,' but not before creating a sensation in Europe as a man of Cathay.

Frobisher was optimistic about his strait; he told Willes that 'the further he travailed in the . . . passage . . . the deeper always he found the Sea.' Hakluyt alleges that Ortelius came to England in 1577 'to pry and look into the secrets of Frobisher's voyage,' and asserted that but for the wars of Flanders the Dutch would have forestalled the English in the north-west. The *Gabriel* had returned to England on October 2nd; an incident is described by George Best that was to divert the next two voyages to gold seeking.

Best says that Frobisher asked those who first got ashore on the largely ice-bound coast 'to bring him whatsoever thing they could first finde, whether it were living or dead, stocke or stone, in token of Christian possession.'

'and one brought a piece of blacke stone much like to a sea cole in colour, which by the weight seemed to be some kind of metall or minerall. This was a thing of no account in the judgement of the captaine at the first sight; and yet for novelty it was kept in respect of the place from whence it came.

'After his arrival in London . . . it fortuned a gentlewoman . . . to have a piece thereof, which by chance she threw and burned in the fire, so long, that at the length being taken forth, and quenched in a little vinegar, it glistered with a bright marquesset of golde. Whereupon the matter being called in some question, it was brought to certaine Goldfiners in London to make assay thereof, who gave out that it held golde, and that very richly for the quantity. . . .

'In conclusion, the hope of more of the same golde ore to be found kindled a greater opinion in the hearts of many to advance the voyage againe. Whereupon preparation was made for a new voyage against the yere following, and the captaine more specially directed by commission for the searching more of this golde ore than for the searching any further discovery of the passage. . . .'

Frobisher's first reaction was due, according to Hugh Languet, to his belief, still widely held at the time, 'that cold lands could breed no precious metals.' Hence the sensation caused by the apparent discovery of gold in a northern land.[2]

Three ships sailed on the second expedition, on May 26th, 1577, the *Aide*, the *Michael*, and the *Gabriel*; with 'seven score Gentlemen, souldiers and sailers.' Falling in with the 'Friseland' coast, the ships went on to the so-called 'streights' to collect some two hundred tons of what Settle calls the 'supposed gold ore.' He describes the harsh weather experienced at times even in the short northern summer. Off 'Friseland' (Greenland) he writes, 'we tasted the most boisterous Boreal blasts mixt with snow and haile, in the moneths of June and July, nothing inferior to our untemperate winter.' Again—'Whoso maketh navigations to those Countreys, hath not onely extreme winds, and furious seas to encounter withall, but also many monstrous and great Islands of yce.'

Settle describes the Frobisher Bay region—'The Countreys on both sides of the streights lye very high with rough stony mountaines and great quantitie of snow thereon. There is very little plaine ground and no grasse, except a little which is much like unto mosse. . . . There is no wood at all. . . . Howbeit there is great quantity of Deere. . . . There are also hares, wolves, fishing bears and sea foule of sundry sorts.' Further, there is 'no manner of creeping beast hurtfull,' except spiders, which many affirm are 'signes of great store of gold,' and certain stinging 'Gnattes' which bite fiercely and cause acute discomfort. The Englishmen, he writes, 'marched through the Countrey, with Ensigne displaied, so farre as was thought needfull, and now and then heaped up stones on high mountaines, and other places in token of possession. . . .'

Narratives of the Frobisher voyages, and of others made

to the north-west, have numerous references to Eskimo life, indicating primary dependence on seals and the American reindeer, i.e. the caribou. There is respect for their hunting technique and disgust at their habit of eating raw or nearly raw 'flesh, fish and foule.' Their riches, writes Settle, are 'tents and botes, made of the skins of red deare and seale skins: also dogs like unto wolves, but for the most part black.'

Immediately after returning from the second voyage, Milford Haven being reached on September 23rd, 1577, Frobisher, George Best relates, 'repaired with all hast to the Court being then at Windsore, to advertise her Majestie of his prosperous proceeding, and good successe in this last voyage, and of the plenty of gold Ore, with other matters of importance which he had in these Septentrionall parts discovered.' The captain and 'the rest of the Gentlemen in this service' were commended, and the new land was called Meta Incognita. As to the next voyage—

'it was thought needful, both for the better guard of those parts already found and for further discovery of the Inland and secrets of those countreys, and also for further search of the passage to Cataya (whereof the hope continually more and more increaseth) that certaine numbers of chosen souldiers and discreet men for those purposes should be assigned to inhabite there. Whereupon there was a strong fort or house of timber, artificially framed, and cunningly devised by a notable learned man here at home, in ships to be carried thither, whereby those men that were appointed to winter and stay there the whole year, might as well bee defended from the danger of the snow and cold ayre, as also fortified from the force of offence of those country people. . . . The whole number of men which had offered, and were appointed to inhabite Meta Incognita all the yeere, were one hundred persons, whereof 40 should be mariners . . . 30 Miners . . . and 30 souldiers . . . within which last number are included the Gentlemen, Goldfiners, Bakers, Carpenters and all necessary persons. . . .'

On May 31st, 1578, no less than fifteen ships left Harwich; and on June 20th, writes Best, 'the General descried land and found it to be West Friseland, now named West England.' Some went ashore and took possession for the Queen, 'And

being there landed, they espied certaine tents and people . . . which were (as they judge) in all sorts very like those of Meta Incognita.' The coast of Greenland was left on June 23rd, the last cliff in sight being designated 'Charing Cross.' Early in July, after difficulties with ice and fog, and 'a sudden terrible tempest at the south-east,' it was realised that the ships were not in 'Frobisher's Streights' but in what were called the 'mistaken straightes,' with a strong current setting towards the west. Thus was Hudson Strait entered and some, at least, thought it was linked with Frobisher's earlier so-called passage. We are told that

'if it had not bene for the charge and care he had of the Fleete and fraughted ships, he both would and could have gone through to the South Sea, called Mar Del Sur, and dissolved the long doubt of the passage which we seeke to find to the rich country of Cataya.'

Frobisher decided to make for Meta Incognita, promising safe arrival and taking pains 'somewhat to appease the feeble passions of the fearefuller sort'—there had been murmurs in some quarters at his 'wilfull maner of proceeding.' To add to the misfortunes already encountered, another storm was to delay arrival at the desired haven. Best, in describing this, noted the temperature contrasts in the northern summer:

'In this storme being the sixe and twentieth of July, there fell so much snow, with such bitter cole aire, that we could not scarce see one another for the same, nor open our eyes to handle our ropes and sayles, the snow being halfe a foote deepe upon the hatches of our ship, which did so wet thorow our poore Mariners clothes, that hee that had five or sixe shifts of apparell had scarce one drie threed to his backe, which kind of wet and coldnesse, togither with the overlabouring of the poore men amiddest the yce, bred no small sicknesse among the fleete . . . every man perswading himselfe that the winter there must needes be extreme, where they found so unseasonable a summer. And yet notwithstanding this cold aire, the Sunne many times had a marvellous force of heate among the mountaines, insomuch that when there is no breth of winde to bring the colde aire from the dispersed yce upon us, we shall be wearie of the bloming heate.'

It was not until August 2nd that all the ships had arrived, save four, and one known to be lost. The delay, together with the fact that the absentee vessels carried parts of the dwelling and some of the winter provisions, led to abandonment of the wintering project, despite Captain Fenton's willingness to stay with sixty men.

Early in September, signs of winter having been observed with apprehension, the fleet returned, 'arriving in England about the first of October, some in one place and some in another.' Some forty men had failed to return, 'which number is not great, considering how many ships were in the fleet, and how strange fortunes we passed.' The ships were laden with ore, and a return in the following year seems to have been anticipated—'we sowed pease, corne and other graine, to prove the fruitfulnesse of the soyle against the next yeere.' However, the ore illusion was to be completely dispelled; and Cathay had not been reached. Michael Lok was to spend some time in the Fleet prison owing to financial obligations being unmet.

In the year of Frobisher's voyage to the north-west, 1577, Francis Drake set out on a voyage that encompassed the globe and returned with much plunder in 1580. This voyage represented a departure from the previous attitude of deference to Spanish claims to monopoly, which had caused English discovery efforts to be limited to the north. Drake entered the Pacific by the Straits of Magellan, and sailed northwards along the American coast; part of his plan was to seek the western terminus of the Strait of Anian, between about 40° and 50° N., in the region that he called New Albion. This visit, in E. G. R. Taylor's view,

'proved that there was no reason to suppose the approaches from the north to be blocked by a land bridge, while the land he claimed in the Queen's name was that already pointed out by Gilbert as suited to serve as a half-way house to the East, supposing the northwest or northeast passages to be opened.'

Actually, it was rumoured later that Drake had returned from the Pacific by the north-west passage. After the failure of three consecutive efforts made from the Atlantic in the

years 1585, 1586 and 1587, John Davis sailed with Sir Thomas Cavendish (who had already sailed round the world in the years 1586–88), on the understanding that he should have facilities 'to search that northwest discovery upon the back parts of America.' This plan is described in the dedication of his *Seaman's Secrets*, a treatise on navigation that he published in 1594. Such a search, it came to be believed, had been successfully made by a Greek who had assumed the name of Juan de Fuca; the strait south of Vancouver Island bears his name today.

Juan de Fuca related the story of his spurious exploit, perhaps a fanciful distortion of an actual voyage, to Michael Lok in Venice in 1596. Purchas printed Lok's account of the episode as one of his arguments for a north-west passage. The English merchant apparently wrote to Lord Cecil, Sir Walter Raleigh, and Richard Hakluyt, 'that famous cosmographer,' requesting one hundred pounds to finance the journey to England of the Greek, so that he could sail through the passage for the Queen, in thirty days. The money was not forthcoming, and by the time Lok had collected some dues from the 'Companie of Merchants of Turkie,' and endeavoured to contact the old man, in 1602, he was either dead or very ill. Lok's story had influence at the time, and long afterwards. James Cook was looking for the western end of the Strait of Juan de Fuca in 1778, in about 48° N., and he was not the only explorer to be influenced by the story.

The account by John Janes of the first voyage made by John Davis to the north-west, in 1585, refers to the gap of several years since Frobisher sailed in 1578. He mentions the search as 'unhappily given over by accidents unlooked for, which turned the enterprises from their principall purpose.' Humphrey Gilbert had lost his life in a return voyage from Newfoundland in 1583, but his brother, Adrian, shared his enthusiasm and played an important part in the background of the expedition led by his friend, John Davis. The merchants of London and the west of England were willing to back the enterprise, and the *Sunneshine* and the *Mooneshine*, of fifty and thirty-five tons respectively, left Dartmouth on June 7th, 1585, returning on September 29th. Davis wrote a summary

account of his three successive voyages in his work called the *Worldes Hydrographical Description,* published in 1595, devoted to arguments for the existence of a passage. Of his first voyage, he wrote:

'I shaped a northerly course . . . and fell upon the shore which in ancient time was called Groenland . . . I called the same Desolation . . . in thirtie leagues sayling upon the west side of this coast . . . we were past all the yce and found many greene and pleasant isles bordering upon the shore, but the hills of the maine were still covered with great quantities of snow . . . I mored . . . in the latitude of sixtie foure degrees or there about. The people of the countrey . . . came downe unto us in their Canoas . . . by whome as signes would permit, we understood that towards the North and West there was a great sea . . . we departed, and finding the sea free from yce supposing ourselves to past all daunger we shaped our course Westnorthwest thinking thereby to passe for China, but in the latitude of sixtie sixe degrees we fell with another shore, and there found another passage of twenty leagues broad directly West into the same, which we supposed to be our hoped straight, we entered into the same thirtie or fortie leagues . . . then considering that the yere was spent . . . we tooke it our best course to returne with notice of our goode success for this small time of search.'

Davis thus emphasised the relatively favoured character of the west coast of Greenland, where he moored in Gilbert Sound, the modern settlement of Godthaab being situated on it. He crossed Davis Strait, and his passage was but Cumberland Gulf, in Baffin Land.

On May 7th, 1586, the *Mermayd* of 120 tons, the *Sunneshine,* the *Mooneshine,* and a pinnace of 10 tons called the *North Star,* left Dartmouth 'to search the bottome of this straight because by all likelihood it was the place and passage by us laboured for.' The *Mermayd* 'found many occasions of discontentment' and deserted in 66° N. on the west coast of Greenland. Two vessels had been detached earlier to explore passage possibilities to the east of Greenland; approaching from Iceland they were baffled by ice. Thus Davis in the *Mooneshine* unaccompanied, crossed Davis Strait to Exeter Sound, and then sailed south past the entries to Cumberland

Gulf and Frobisher Bay, and past the entry to Hudson Strait; his hopeful passage entry on the Labrador coast was probably Hamilton Inlet. By early October he was back in England, with a cargo of cod and reports of rich fisheries. He lost the support of some merchants but found sufficient backing for a third voyage.

On May 19th, 1587, the *Elizabeth*, the *Sunneshine* and the *Helene* left Dartmouth. Two of the vessels were to engage in fishing and Davis in the *Helene* was to conduct exploration. He sailed up the west Greenland coast 'to 73 degrees, in a great sea, free from yce' thus entering Baffin Bay. Thence he sailed west 'fortie leagues and fel upon a great banke of yce: the wind being north' he was forced to sail to the south, away from the lure of a 'great sea, free, large, very salt and blew and of an unsearchable depth.' Cumberland Gulf was found to be no passage and Davis returned to Dartmouth on September 15th. By 'reason of the Spanish fleet' and the death of his supporter, Sir Francis Walsingham, secretary to the Queen, his belief in an open passage 'towards the North' could not be followed up.

If experiences of pioneers in northern waters had proved disappointing to numerous merchants, there were still those with unshaken convictions. Sailing to the east by the Cape of Good Hope had shown many dangers to exist; there was a high death rate from disease, and voyages lasted two years or more. Thus we find the East India Company, which had received its charter in 1600, jointly with the Muscovy Company promoting the voyage of George Weymouth in 1602, a voyage which achieved no advance on previous efforts. It was, however, some years later, with the efforts of Sir Thomas Smith, Sir Dudley Digges and John Wolstenholme that an important new phase of effort commenced. They supported the fourth voyage of Henry Hudson to the north in 1610, and played a leading part in securing in 1612 a charter for the 'Governor and Company of the Merchants of London, Discoverers of the Northwest Passage,' generally known as the Northwest Company.

Hudson sailed on April 17th, 1610, in the *Discovery*, entering Hudson Strait early in August. He went on to examine the

east coast of the bay named after him (although others had doubtless preceded him in entering the Bay). The winter was spent in the James Bay region in a miserable atmosphere of hardship and bickering amongst the crew. Abacuk Pricket wrote in his account, printed by Purchas,

'and so into a Bay, where wee came to anchor. Here our Master sent out our Boat, with my selfe and the Carpenter to seeke a place to winter in: and it was time; for the nights were long and cold, and the earth covered with Snow. Having spent three months in a Labyrinth without end, being now the last of October, we went downe to the East, to the bottome of the Bay . . . we . . . found a place, whereunto we brought our ship, and haled her aground: and this was the first of November. By the tenth thereof we were frozen in. . . . Wee were victualled for six moneths in good proportion . . . it behoved us to spend, that we might have (when time came) to bring us to the Capes where the Fowle bred, for that was all the hope wee had to bring us home. Wherefore our Master tooke order, first for the spending of what we had, and then to increase it, by propounding a reward to them that killed either Beast, Fish or Fowle. . . . About the middle of this moneth of November died John Williams our Gunner: God pardon the Masters uncharitable dealing with this man. Now for that I am come to speak of him, out of whose ashes (as it were) that unhappy deed grew which brought a scandall upon all that are returned home . . . not to wrong the living, nor slander the dead, I will (by the leave of God) deliver the truth as neere as I can. . . .'

A dismal narrative of dissension follows, in strong contrast to the harmony that seems generally to have characterised the crews that sailed to the north and endured hardships and prolonged isolation. With the advent of spring came privation; the 'Fowle of one kinde (which were partridges as white as milke)' that for three months had yielded welcome food were replaced by 'Swanne, Geese, Duck and Teale . . . hard to come by.' The men went into the 'Woods, Hilles and Valleys, for all things that had any shew of substance in them, how vile soever: the mosse of the ground, then the which I take the powder of a post to bee much better, and the Frogge (in his ingendring time as loathesome as a Toade) was not spared.'

Fishing yielded very variable returns, and the Eskimos eluded Hudson when he attempted to obtain food from them. Mutiny followed and the leader and some others were cast adrift in a boat, never to be heard of again.

Some of the remaining crew were later killed by Eskimos, and on the return voyage the men were 'so weake, that they could not stand at the Helme, but were faine to sit'; 'fowle' and candles became the main food, the latter 'a great daintie' and limited to a pound a week per man. The survivors were 'summoned by the officials of Trinity House and their depositions taken; at the same time the discovery they had made was of such vast importance that every effort was made by these officials to learn what they could about it . . . great attention was paid to the currents encountered in the strait and bay.' The conclusion reached was that 'the bay . . .must be fed by the ocean . . . on the north-east side of the continent, because the current did drive perpetually from the east . . . we think that the passage is to be found between the west and the north-west, and not more northerly.'[3]

The next effort was made by Thomas Button, who sailed in April, 1612, with the *Resolution* and the *Discovery*. He examined the coast of Hudson Bay between Wager Bay and Port Nelson, wintering at the latter point and making careful tidal observations. In the summer of 1613 he entered Roe's Welcome, between the mainland and Southampton Island, and thinking it to be a bay, returned to England; in his view the passage was to the north of Southampton Island.

Further important voyages for the Northwest Company were made by William Baffin in 1615 and 1616, under the leadership of Robert Bylot, who had sailed with both Hudson and Button. Baffin was a skilled pilot with three voyages to his credit in the north, he having visited Greenland and Spitsbergen. In the voyage that commenced on March 15th, 1615, Baffin entered Foxe Channel and sailed along the coast of Southampton Island to Frozen Strait, the link between Roe's Welcome and this channel.

The *Discovery* was checked by ice and after making tidal observations in Hudson Bay, Baffin returned, doubtful of a passage by the Hudson Bay approach and convinced that

Davis Strait gave the best promise. Baffin had the exceptional qualification of being able to calculate longitude at sea, and his narratives give some positions obtained by 'celestiall observations'—with truth, he writes 'in these workings may some errour be committed if it be not carefully looked unto . . . yet if observations of this kinde, or some other, at places farre remote, as at the Cape Bonasperanze, Bantam, Japan, Nova Albion, and Magellan Straits, I suppose we should have a truer Geography than we have.'

On March 26th, 1616, the *Discovery* sailed once more, and followed the west coast of Greenland as far as 78° N. To the north of the bay named after him Baffin noticed the entry to Sir Thomas Smith Sound, and on the west in sailing to the south, he passed the entries to both Alderman Jones and Sir James Lancaster Sounds—'here our hope of passage began to be lesse every day . . . for from this sound to southward, wee had a ledge of Ice betweene the Shoare and us. . . .' Ice continued to frustrate any advance to the west and in 65° 40′ N. the search was abandoned, Baffin having recourse to Greenland to seek scurvy grass, which, boiled in beer, restored his men to health.

After his return in late August, Baffin wrote to Master John Wolstenholme 'there is no passage, nor hope of passage in the North of Davis Streights, wee having coasted all or near all the circumference thereof, and finde it to be no other than a great Bay, as the Map here placed doth truly shew. . . .' He goes on to argue that whaling should be profitable. Unfortunately Baffin's map has not survived; Purchas in a marginal note describes as 'somewhat troublesome and costly to insert.' Thus in effect the visit of Sir John Ross to Baffin Bay in 1818 was in the nature of rediscovery; obscurity had by that time surrounded the achievements of the earlier navigator.

It is not surprising that after so final a verdict from a highly respected seaman, interest by the Northwest Company was no longer maintained. Baffin transferred his activities to tropical waters and was killed at Ormuz in 1622. However, Sir John Wolstenholme was still interested in the Hudson Bay

approach and he played a part in the preliminary moves that led to the voyage by Luke Foxe in 1631.

An ardent advocate was the mathematician Henry Briggs, who had written a short treatise on the subject in 1616. In this a very optimistic view is taken of Button's tidal observations—'the constant great Tydes every twelve hours, and the increase of those Tydes whensoever any strong Westerne winde did blow, doth strongly perswade us that the mayne Westerne Ocean is not farre from thence.' Sir Thomas Button himself was approached for an opinion and declared himself as convinced of the existence of a passage in the Hudson Bay region as he was of the existence of the Straits of Dover.

Foxe, before he sailed, had discussions with another authority, Sir William Monson, who had made a close study of the work of Hudson. Curiously enough in 1631 also, Thomas James made a competitive venture, supported by the merchants of Bristol. King Charles granted equal rights to the two groups of petitioners. The *Henrietta Maria* left Bristol on May 2nd, the *Charles* departed from Deptford on May 5th. Luke Foxe brought the *Charles* back to England on October 31st, James wintered on Charlton Island in James Bay, spending the period between late November and early in the following July under wretched conditions, suffering from cold and sickness—although, he wrote, no more than from mosquitoes in summer. The *Henrietta Maria* arrived back on October 22nd, 1632.

Neither Foxe nor James had found a navigable north-west passage, but Foxe had followed the coast of Hudson Bay between Port Nelson and the western entry to James Bay, and had entered the channel that bears his name. After his return he still held that there was the possibility of a passage by Roe's Welcome, and that the activities of whalers would ultimately lead to its discovery.

James largely followed in the wake of Foxe, adding little to geographical knowledge, although he was a careful observer. Burpee sums up their contrasted characters—'Foxe was . . . essentially a man of deeds; a bluff, fearless, boastful, more or less uneducated sailor; a man of no refinement, but of tireless energy and resourcefulness. James, on the other hand, though

in general education and technical knowledge Foxe's superior, lacked his practical seamanship; lacked also his power to command and his capacity for meeting circumstances as they arose. . . .'[4] E. G. R. Taylor notes that Foxe 'although supplied, according to his own account with plenty of money to buy books for his Northwest voyage, . . . took none, declaring that in the first place there was no leisure at sea for reading, and in the second that in an emergency the important thing was not to rush away and consult a "Waggoner," but to act.' (A 'Waggoner' was a translation of the work of the Dutchman Lucas Waghaener, the *Mariner's Mirror*, made available in 1588.) James 'carried with him "a chest full of the choicest Mathematical books that could be got for money in England; as likewise Master Hakluyt and Master Purchas. . . ." ' His scientific observations, it was suggested, might be of more profit to Cambridge students of Natural Philosophy than a study of ancient authors.

The voyages made by Foxe and James mark the end of the important period of exploration which began in 1576. However, the motive of reaching Japan and China by a short sea route from England, in order to promote trade, was still in evidence in the eighteenth century. The Hudson's Bay Company, by its charter of 1670, had exploitation of the fur trade for its primary objective, but passage search was to be prosecuted also. In fact, little was done in this direction, and only in unimportant voyages commencing in 1719. The company was accused of indifference or hostility to a quest that still had its advocates.

James had argued that the search was in vain; even if a strait existed, which he refused to believe, navigation would be impossible from October to July. Foxe, however, in his *Northwest Foxe*, or *Foxe from the Northwest Passage*, published in 1635, gave grounds for hope. Moreover, to the Juan de Fuca story came to be added the alleged exploit of Admiral Bartholomew de Fonte, sailing for Spain from Callao, in 1640; the story was published in 1708, and is regarded as the 'invention of one James Petiver, a contributor to the *Monthly Miscellany*.'

De Fonte said he met with a vessel from New England,

when he made his journey from the Pacific towards Davis Strait; his travel was partly by river, in canoes, and he denied that a passage existed; but Jeffreys and Dobbs, two enthusiasts for the passage search, adapted the story to support their argument for the existence of a strait navigable for sea-going ships, between California and Hudson Bay. Dobbs, an Irish engineer, was the leading figure in the movement that led to the sailing of Christopher Middleton in 1741 to Wager River inlet, and Roe's Welcome, which he followed to 66° 40′ N. (Repulse Bay) when he was checked by ice. Dobbs believed that Wager Inlet was a strait leading to the Pacific, and that Middleton was concealing the truth in the interests of the Hudson's Bay Company. He obtained merchant support for another voyage; in 1745 the government offered a reward of £20,000 for success in finding a passage from Hudson Bay. The *California* and the *Dobbs-Galley* sailed in 1746; Wager 'Strait' was proved in fact to be the outlet of Wager River and no passage was found. N. M. Crouse concludes that 'The expedition of the *Dobbs-Galley* was the last attempt to force a passage through the western side of Hudson Bay and the last effort to find a strait in the north for commercial purposes.'

[1] See E. G. R. Taylor, *Tudor Geography*, for 'diagrammatic sketches of various concepts of the polar regions and passages.'

[2] For an excellent account of the Frobisher voyages and some discussion of the gold question, G. B. Manhart, *The English Search for a Northwest Passage in the Time of Queen Elizabeth*. Philadelphia, 1924.

[3] See Nellis M. Crouse, *In Quest of the Western Ocean*. London, 1928. This is a valuable work with a useful bibliography.

[4] L. J. Burpee, *The Search for the Western Sea*. Toronto, 1935. This work on the history of the exploration of North West America is especially valuable on the Hudson Bay region.

8

TERRA AUSTRALIS: DE QUIROS AND TASMAN

The Pacific Ocean is variously defined but may broadly be regarded as extending from the Bering Sea to Antarctica, from the Pacific coast of the Americas to the eastern fringes of Asia and Australia. About one-third of the total area of the globe is comprised within it. Exploration by Europeans began in the early sixteenth century and, on broad lines, had finished by the late eighteenth century. Explorers of several nationalities participated in a phase of history that led not only to a great extension of geographical horizons, but to new phases of exploitation and settlement, mainly by Europeans and Americans. In the late eighteenth century, and subsequently, infiltration on an increasing scale of whalers, sandalwood traders, missionaries, and, in Australia and New Zealand, of colonists, brought disintegration to the Polynesian, Melanesian and Micronesian cultures of the Pacific realm. From a very large field of study we select as our main theme for this chapter the quest for a great unknown southern continent, in so far as Spain and Holland were interested, in the sixteenth and seventeenth centuries. Some consideration of Magellan's voyage is an essential prelude.

It was Ferdinand Magellan, a Portuguese navigator who sailed for Spanish masters, who first demonstrated that a wide ocean lay to the west of the Americas. He was seeking a route by westward sailing, to the Moluccas or Spice Islands, thought to lie within the Spanish sphere, as demarcated by the Pope. Five ships left San Lucar in September 1519, and after the passage of the strait named after the leader of the expedition, three of these ships, the *Trinidad* (110 tons), the *Concepcion*

(90 tons) and the *Victoria* (85 tons) entered the Pacific Ocean on November 28th, 1520. They were ill prepared for the crossing of what proved to be an immense ocean, a crossing that was barely possible given the navigational technique of the time.

The only land seen before the Ladrones (Marianas) were reached on March 6th, 1521, consisted of two small uninhabited islands, 'San Pablo' and 'Tiburones,' a few days' sail apart. Ten days later an island in the archipelago of St. Lazarus (later to be called the Philippines) was reached. The Italian Antonio Pigafetta relates that three months and twenty days were passed before fresh supplies were obtained from the inhabitants of the Ladrones. Resort had been had to worm-infested biscuits, putrid yellow water, ox hides that had covered the mainmast, sawdust, and rats; the losses from sickness were high. Fortunately wind and weather favoured the vessels. Once the zone of the westerlies was left behind, the easterly trades were favourable (not until 1565 did Andres de Urdaneta find the key to the problem of the return from the Philippines, by sailing first north into the belt of the northern westerlies).

The orthodox view of the precise route taken by Magellan is that derived from the Francisco Albo log, i.e., north along the west coast of South America to about 30° N. and thence west-north-westerly. G. E. Nunn has shown that there is good ground for questioning this and suggests that the marked discrepancy of the various contemporary accounts as to '(1) the latitude in which the expedition left the vicinity of the coasts of South America, (2) the latitude of San Pablo and Tiburones, (3) the direction sailed, and (4) the distance traversed in the Pacific,' suggests 'a purpose to deceive.' The motive he suggests was Magellan's determination to show that the Spice Islands were in the Spanish sphere.[1]

Soon after the existence of Magellan Strait became widely known it was portrayed on some world maps; a northern lobe of a conjectured southern continent would sometimes be shown, stretching south from Tierra del Fuego. Another great extension northward of Terra Australis Incognita was sometimes shown reaching almost to New Guinea. The Dieppe school of cartography (1530–50) indeed produced works that

suggest a rough outline of northern Australia. There is controversy as to whether this was due to guessing, or early discovery by the Portuguese, discovery perhaps kept secret for fear of leading interlopers to good bases for participation in the spice trade.

Jean Rotz presented an atlas to Henry VIII in 1542 'in effect a great world-map on a plane projection, cut up into leaves . . . its author excludes hypothetical outlines; he sets down what he believes to be known . . . we might expect to find, in its south-western Pacific, nothing but empty sea. What we do find may conceivably be a map of Australia. . . . If these early cartographers merely guessed the existence of Australia, they made an extraordinarily correct guess; and Rotz at least indulged in no guess-work in dealing with any other part of the world which appears in his atlas.' J. A. Williamson notes that the name given to this land, Java la Grande, was dropped in the more theoretical delineations of Mercator (1569) and Ortelius (1570) and they 'inscribed on Australia the legends gathered from Marco Polo: "Beach, provincia aurifia"—"Locach regnum"—"Maletur." Meanwhile there were others who relied upon their reading of the scriptures and placed the islands of the King of Solomon adjacent to the tropical coasts of this fascinating continent."[2]

Although belief in the existence of a southern continent goes far back into history, it was the *Travels* of Marco Polo that provided much of its romantic attraction. Locac (Lochach, Laach, or Boeach) and Malaiur (Maletur) were described in attractive if somewhat vague terms:

'On leaving this island of Java, one sails between south and southwest for 700 miles, after which one finds two islands, one larger and one smaller. The one is called Sondur, and the other Condur. They are two uninhabited islands. . . .

'One leaves these islands and proceeds for some 500 miles to the south-east. One then reaches a continental province, called Locac, which is very large and rich. . . . In this country there grow immense quantities of brazil-wood and ebony. They have great abundance of gold, so great indeed, that no one could believe it without seeing it. . . .'

'Malaiur' is more remote:

'You must know that when one leaves Locac, one sails 500 miles to the south, and reaches an island called Pentan, which is a very wild place. . . . Let us leave this place, and proceed between these two islands for some 60 miles . . . one sails on to the south-east for some 30 miles; then one reaches an island that forms a kingdom; both it and its capital are called Malaiur. The city is very large and noble. There is a great deal of trade in spices. . . .'

It was the gold of 'Beach' that in John Dee's view was a worthwhile objective for the English adventurers; he was strongly influenced, as were many others, by the maps of Ortelius and Mercator. Although there was interest in the late sixteenth century, and the first quarter of the seventeenth, no Englishman, in fact, sought Terra Australis. The English entries into the Pacific in this period were piratical and merely made for Spanish apprehension that further discoveries might provide further lures, and possible bases for interlopers. The long interval, for example, between the voyage made by Alvaro de Mendana and Pedro Sarmiento de Gamboa, from Callao in Peru, in 1567, in which the Solomon Islands were discovered, and that made by Mendana and Pedro Fernandez de Quiros, from Callao, in 1595, to attempt a further visit, is in part at least to be explained by the successful raids of Drake and Cavendish. Significantly the second voyage followed on the reverse experienced by Hawkins in 1594.

When Gamboa set out with Mendana on November 19th, 1567, accompanied by seventy soldiers and four Franciscan friars, he was influenced in part by an Inca tradition that Tupac Yupangri had found two rich islands away to the west. According to Hernando Gallego, however, they set out for the 'discovery of certain islands and a continent . . . because men well versed in mathematics had deduced that they existed for certain in these positions. . . .' They hoped to reach their goal by sailing six hundred leagues to the west, but in fact sailed one-third of the way round the world before reaching their 'Western Isles.'

Soon after their return, on September 11th, 1569, the

islands became linked to Old Testament history and were known as the 'Solomons.' Gamboa and Mendana had sailed some two thousand miles further from Lima than their estimate of fourteen hundred and fifty leagues. When on April 5th, 1595, Mendana sailed with Quiros as chief pilot to find the islands, thought to be not far from Terra Australis, taking a number of soldiers and women and children to found a colony, in actual fact it was the Marquesas and Santa Cruz that were encountered and not the group sought. Not until the time of Cook could longitudinal position be fixed with sufficient accuracy to render such gross errors impossible.

When Quiros made his second Pacific voyage, commencing on December 21st, 1605, at Callao, it was with Luis Vaez de Torres; some three hundred soldiers and sailors sailed on this occasion with priests to convert to Roman Catholicism the inhabitants of Terra Australis. This bold venture was marred by mutiny and dissension, due in part to the Portuguese origin of the leader. Quiros parted from Torres in what later came to be called the New Hebrides, one of which he called 'Austrialia del Esperitu Santo,' having decided that it was part of the great southern continent and not far removed from the Solomons, Santa Cruz and New Guinea.

Quiros arrived back in Acapulco on November 23rd, 1606, and, obsessed by the urgency of augmenting the dominions of Spain and of saving the souls of the inhabitants of Terra Australis, proceeded to Madrid in 1607 and drew up many memorials to impress authority with the need for further exploration. In one he describes Austrialia Incognita, so called after the Duke of Austria, in the following terms:

'The greatness of the land newly discovered, judging from what I saw, and from what the Captain Don Luis Vaez de Torres, the Admiral under my command, reported to your Majesty, is well established. Its length is as much as all Europe and Asia Minor as far as the Caspian and Persia, with all the islands of the Mediterranean and the ocean which encompasses, including the two islands of England and Ireland. That hidden part is one fourth of the world, and of such capacity that double the kingdoms and provinces of which Your Majesty is at present the Lord could fit into it, and this without any neighbourhood of Turks or Moors,

or others of the nations which are prone to cause disquiet and unrest on their borders.

'All the lands that were seen fall within the torrid zone, and a part of them touch the equator . . . and if they turn out as they promise, there will be lands that are antipodal to the greater part of Africa, to all Europe, and to the greater Asia.

'I would remark that the lands I saw in 15° are better than Spain, as will be seen presently, and that others, which were on the heights in front, should be an earthly paradise.'

Quiros believed the inhabitants to be numerous. He found those he met to be 'simple heathens, divided into tribes, and with little friendship between them . . . with the aid of divine providence, and by gentle means, it will be very easy to pacify, to indoctrinate and to content them.' If they were somewhat disappointing, seeking 'with the least work possible to pass their lives, not to tire themselves about the rest of the things which tire us,' yet there were 'certain indications of the neighbourhood of a more civilised people. . . .'[3]

Quiros died at Panama on his way back to Lima, where he expected to be given facilities for his great quest. The real views of the authorities are seen in a Report of the Council of State made to the King of Spain on September 25th, 1608:

'now also has been considered in the Council, according to Your Majesty's directions, the enclosed report from that [i.e., the Council] of the Indies respecting the proposal made by Pedro Fernandez de Quiros, what he has gone through in the said discovery, and what he seeks in order to continue it. And the Council, having considered the matter with the attention which its importance requires, is of opinion that the Council of the Indies is correct in what it says, for it being certain that what is discovered in the Indies withdraws men from Spain, which is so short of men, as is evident, it may be feared that fresh discoveries will lead to greater injury and open a way for your Majesty's enemies to go to occupy them, since besides the lack of men which exists in these kingdoms for fresh conquests, Your Majesty's treasury is so exhausted that there will be much strain in retaining what has been discovered and the Council is not sure that with good conscience it is possible to make these conquests of heathens who neither disturb nor attack us. That this Pedro Fernandez de Quiros has got it into

his head to be a second Columbus, and seeing that from what is aforesaid his design cannot be encouraged, it is not desirable to drive him to despair on account of what he has seen and discovered, and the risk there would be that he might have recourse to Your Majesty's enemies to occupy it; and therefore, taking for granted that it will be best not to discuss this fresh discovery, it is of opinion that this man being so experienced should be retained here as cosmographer in order that he may be of service in marine charts and globes. . . .'[4]

Diego de Prado, under whose command Torres continued the voyage from Austrialia del Esperitu Santo, was a bitter critic of Quiros:

'Your Majesty should understand that the said Pedro Fernandez de Quiros is a liar and a fraud; for, by his fault, he did not discover that which the Count of Monterey most desired, namely, the crown of the Antarctic Pole, though we were so near to it. Nor should Your Majesty give credit to a man who suffered a mutiny in his ship, such as was raised by the sailors, he having been warned. And so they treated him as the man he is, fit to be of the Rua Nova in Lisbon, in whose mouth there is naught but lies, bragging and disloyalty: and so I advise Your Majesty to trust him as you would a clerk in a merchant ship. . . .'

The fault referred to in this letter from Goa written in 1613 is given some prominence by Prado in his 'Relation,' an account of the continuation of the voyage in which Torres sailed through the strait between New Guinea and northern Australia, named after him, eventually reaching the Moluccas and going on to Manila. To Prado and others 'great and very dense masses of cloud and mist which the earth is wont to discharge . . . are signs of land and if they are large it is a great country,' but he alleges that Quiros was not interested in an idea that was not his own.

We have noted that Mendana sought in 1567 a continent not far to the west of South America, a quest renewed by others later. One of the arguments that came to be used for its existence was a claim that a certain Juan Fernandez had actually landed on its shores. The story is to be found in a memorial drawn up by Juan Luis Arias, an advocate of

Santiago de Chile, and presented to Philip III some time after 1614. The fact from which this fiction sprang was the actual discovery of the island of Juan Fernandez in 1563, in the course of the voyage mentioned in the memorial. The latter was a mere preliminary summary in advance of a treatise that would describe the 'Austral hemisphere,' in terms of fertility, climate, peoples, provinces and kingdoms. Arias wrote:

'There was also a pilot named Juan Fernandez who discovered the track from Lima to Chile, by going to the westward (which till then had been made with much difficulty, as they kept along shore, where the southerly winds almost constantly prevail): he sailing from the coast of Chile, in about the latitude of 40°, little more or less, in a small ship, with some of his companions, in courses between W. and S.W. was brought in a month's time to what was to the best of their judgment, a very fertile and agreeable continent, inhabited by a white and well proportioned people, of our own height, well clad, and of so peaceable and gentle a disposition that, in every way they could express, they showed the greatest hospitality . . . their country appeared in every respect very rich and plentiful. . . .'

It was in the late sixteenth century that the Dutch entered the field of maritime enterprise and trade expansion and, in the following decades, made important contributions to the solution of the Terra Australis problem by exploration in the Australasian region. The driving force was provided by the desire to search neighbouring seas for lucrative rewards, but much discovery of coastal stretches of New Holland (not called Australia until the early nineteenth century) was incidental.

From 1605 onwards the northern and western coasts came to be known in places, and, as time was to show, these were the least attractive parts of the continent. In 1611 Brouwer found the western coast in the course of a voyage eastward from the Cape of Good Hope, in the zone of the westerlies, hoping to find a convenient approach to Batavia. In 1619 Frederick de Houtman, with the same destination in view, made a landfall near the site of the modern port of Freemantle, and identified the region with the 'Southland of Beach.' The outstanding Dutch achievement, however, was the voyage of

Abel Tasman, and his pilot Frans Jacobszoon Visscher, a ten months' voyage that started on August 14th, 1642.

The Dutch had found the Australian blackfellows, hunters and gatherers at a stone age level, extremely disappointing. They had hopes of more profit further afield, and Governor General Van Diemen took measures to act on ideas that had been discussed for some time. Visscher had produced in January 1642 a memoir on the subject of a circumpolar Southland. His notions on searching in the extreme south of the Atlantic Ocean were not followed up until the eighteenth century, and then by Frenchmen searching for the land allegedly found, early in the sixteenth century, by their countryman Paulmier de Gonneville. Visscher's ideas, however, of sailing south from Mauritius, and then eastward in the southern Indian Ocean, were embodied in the instructions issued to Tasman. The latter was an experienced seaman, who had sailed under Matthijs Quast in the western North Pacific, in search, in 1639, of alluring but fictitious islands. His Journal has survived and Dampier, Cook and others later made use of its contents.

The *Heemskerck* and the *Zeehaen*, with complements of sixty and fifty men respectively, sailed from Batavia and reached Mauritius after about three weeks' sailing. After a delay due to the necessity for repairs they left for the south on October 8th, 1642, but in 49° S. experienced such harsh weather that the plan of going south to 54° was abandoned and the ships returned to about 44° S. before sailing to the east and sighting what was called Van Dieman's land, later known as Tasmania. Eight days after Tasmania had been left behind, the west coast of the South Island of New Zealand was seen, in about 42° S. This was called Staten Land, and believed to be an extension of the Staten Land of the Dutchmen, Schouten and Le Maire, although this was merely an island south of Tierra del Fuego, which they had discovered in 1616 when on their way to look for the southern continent to the west of South America. Tasman sailed north, missing the entry to Cook Strait, and after leaving the north of North Island proceeded via the Tonga Islands, the Fiji group and northern New Guinea to Batavia.

As a result of this voyage, New Guinea, Australia and Tasmania were often thought of as parts of one great continental island, Terra Australis *Cognita*, with an unknown eastern coast, and separated by sea from any Terra Australis *Incognita* which might lie further south. The leading motive of the voyage, however, had been to find a route to South America by sailing in the westerly wind zone of the southern Pacific, and this notion was further in evidence when Tasman sought, but failed to find, Torres Strait in 1644.

The Dutch authorities in Batavia were interested in further quests. J. C. Beaglehole summed up their visions and the scepticism which they aroused in Amsterdam:

'at the end of 1644, they held within their ambit the further discovery of Tartary, the northern parts of America, "the Southlands recently discovered in the East," and the Solomon Islands. Mines were necessary to the Company's prosperity—gold and silver mines would therefore be found; there was always the prospect, pleasing to Dutchmen and God alike, of looting the Spaniard; and all these things would be for the solace of the shareholders. These far-reaching schemes, these siren notes, stirred no response in the breasts of Managers in Amsterdam.'[5]

[1] See G. E. Nunn, 'Magellan's Route in the Pacific,' *Geographical Review*. New York, October 1934.

[2] J. A. Williamson, *The Exploration of the Pacific*, in Cambridge History of the British Empire, Volume VII, 1933. See also *Cook and the Opening of the Pacific*, 1946, by the same author.

[3] These quotations, and those from the Arias memorial, are from *The Voyages of P. F. de Quiros*, 1595-1606. Edited and translated by Sir Clements Markham. Hakluyt Society, 1904.

[4] This quotation and those from Prado are from *New Light on the Discovery of Australia*, edited by H. Stevens. Hakluyt Society, 1929.

[5] J. C. Beaglehole, *The Exploration of the Pacific*, 2nd edition, 1947.

9

TERRA AUSTRALIS: DAMPIER AND COOK

With the cessation of Dutch efforts in the mid-seventeenth century, little progress was made in the search for a southern continent for more than a century, until, in fact, the Seven Years' War ended with the Treaty of Paris, in 1763. Then France and Britain, long interested in possible new fields of expansion but fully occupied with colonisation, trade and other matters in known areas, took the lead, and James Cook made his outstanding contributions to Pacific discovery. It was William Dampier (1653–1715), not a great explorer and mediocre as a buccaneer, but possessed of great literary talent, who contributed to the long sustained interest of which this was the indirect outcome.

Dampier was not only a contributor to the 'general Magazine of the knowledge of Foreign Parts,' writing on rivers and ports, soils, plants and animals, peoples and their habits and beliefs, but was inspired, at times at least, with curiosity essentially scientific. Sir Napier Shaw finds in his *A New Voyage Round the World*, published in 1697 and dedicated to the President of the Royal Society, the first description of a typhoon.[1] Seamen engaged on ocean sailing were indebted to his work of 1699, *Discourse of the Trade Winds, Breezes, Storms, Seasons of the Year, Tides and Currents of the Torrid Zone throughout the World*. Yet J. A. Williamson has aptly described the author as 'a shady adventurer, an untrustworthy colleague, a morose unstable captain, who inspired neither affection nor respect.'[2]

Dampier's great work of 1697, called by him 'a mixt

Relation of Places and Actions,' was based on travels made in the years 1679–91, in various ships, and under various commanders. In sum they amounted to a circumnavigation, although this outcome was not intended at the outset—the most difficult link in the chain, because of scant provisions, the Pacific crossing from Mexico to Guam, an arduous crossing of fifty days' duration was made only in the hope of raiding Spanish ships off Manila, since privateering had produced only 'Fatigues, Hardships and Losses' on the American coast. None the less, Dampier wrote some interesting, if brief, passages bearing on exploration. He publicised a fictitious land named after Captain Davis, who told Dampier that

'he went, after several Traverses, to the Gallapagoes, and that standing thence Southward for Wind, to 500 Leagues from Capayapo, on the Coast of Chili, he saw a small sandy island just by him; and that they saw to the Westward of it a long Tract of pretty high land, tending away towards the North West out of sight. This might probably be the Coast of Terra Australis Incognita. . . .'

After leaving Timor the buccaneers 'stood off South, intending to touch at New Holland, a part of Terra Australis Incognita, to see what that Country would afford. . . .' Dampier writes, 'it is not yet determined whether it is an Island or a main continent; but I am certain that it joins neither to Asia, Africa, nor America.' The coast of what is to-day called Dampier Land is one of the least attractive areas on the northern coast of Australia and the land and the people, as observed early in 1688, were no more alluring than in Tasman's time.

'The Inhabitants of this Country are the miserablest People in the World . . . setting aside their Humane shape they differ but little from Brutes. . . . They are long visaged, and of a very unpleasing Aspect. . . . Their Hair is black, short and curl'd, like that of the Negroes. . . . The Colour of their Skins . . . is Coal-black, like that of the Negroes of Guinea. They have no sort of Cloaths, but a piece of the Rind of a Tree tied like a Girdle about

their Waists. . . . They have no Houses, but lie in the open Air without any covering; the Earth being their Bed, and the Heaven their canopy. . . . Their only Food is a small sort of Fish. . . . There is neither Herb, Root, Pulse nor any sort of Grain for them to eat, that we saw; nor any sort of Bird or Beast that they can catch, having no Instruments wherewithal to do so. . . .'

William Dampier returned to England in September 1691, having made but little profit from privateering. He soon had, in fact, to sell his part-share in a tattooed Malay, a 'painted prince,' whose fate it was to be exhibited as a curiosity until he died of smallpox at Oxford. However, Dampier's fame spread and he was much sought after for his wide knowledge of men and places as revealed in his book. The somewhat curious result was that Dampier, sent by the Admiralty 'sail'd from the Downs early on Saturday, Jan. 14th 1689, with a fair Wind, in his Majesty's Ship the Roe-Buck; carrying 50 Men and Boys, with 20 months' Provision.'

The *Roebuck* (290 tons) was in an advanced state of decay; yet the task was no less than the exploration of the unknown regions of eastern New Holland and southern New Guinea. The ship 'founder'd thro' perfect Age' near the Island of Ascension on the return voyage. The crew was mediocre, dissensions were rife and on his return William Dampier faced three trials by court martial, and lost nearly three years' pay as the outcome. He discovered New Britain, but this was on the threshold of the unknown and a small matter, compared with his objectives—although he thought 'this island may afford many rich commodities, and the Natives may be easily brought to Commerce.'

The most important outcome of the voyage, made during a lull in the Anglo-French wars, was in fact Dampier's third volume, *A Voyage to New Holland &c. in the Year 1699*; the first part appeared in 1703 and the *Continuation* in 1709. In the Preface he expresses the hope that

'this Third Volume may in some measure be acceptable to Candid and Impartial Readers, who are curious to know the Nature of the Inhabitants, Animals, Plants, Soil etc. in those distant Countries,

which have either seldom or not at all been visited by any Europeans. . . .'

Further—

'I have here as in the former volumes, caused a Map to be Ingraven, with a prick'd line, representing to the Eye the whole Thread of the Voyage at one View; besides Draughts and Figures of particular Places. . . .'

In addition this volume was illustrated with 'cuts and figures . . . of . . . Birds, Beasts, Fishes and Plants.'

Enthusiastic interest in the problem of the unknown southern continent is reflected later in the literary activities of such men as John Campbell, John Callander and Alexander Dalrymple. Campbell, a prolific writer, radically revised and expanded, for publication in the years 1744–48, John Harris's *Navigantium atcue Itinerantium Bibliotheca*, a collection of voyages and travels first published in 1705. Interested primarily in commercial expansion, he gave much attention to voyages to the Pacific and advocated further efforts, for 'we cannot entertain the least Doubt of the Possibility of finding, in the Southern Part of the Globe, Countries worth our looking after.'[3] His work appeared at a time when Lord George Anson had just returned from a voyage round the world—an enterprise that had led to the accumulation of much plunder, but no increase in geographical knowledge.

Callender published in 1766–68 his *Terra Australis Cognita; or Voyages to the Terra Australis or Southern Hemisphere, during the Sixteenth, Seventeenth and Eighteenth Centuries.* He was concerned to show 'the Advantages that may result from further Discoveries of this great Continent, and the Methods of establishing Colonies there, to the Advantage of Great Britain.' The belief, held by many wise and knowing people, that the discovery of Terra Australis Incognita is a chimera, he regarded as a hasty one, of the kind 'fatal to science in general and the art of navigation in particular.' Actually Callander largely appropriated the work of Charles de Brosses, the *Histoire des Navigations aux Terres Australes*, published in Paris in 1756.

Alexander Dalrymple was more than a publicist. His views were set out in *An Account of the Discoveries made in the South Pacifick Ocean, Previous to 1764*, a work first printed in 1767. He was a fervent believer in the existence of the southern continent, parts of the coasts of which he considered to have been discovered by Quiros, Tasman, Davis and others—the unknown interior and its inhabitants awaited the enterprise of the bold explorer; in the latitude of 40°, he argued, the continent must extend through 100° of longitude. Dalrymple had seen service with the East India Company, and by research into the Quiros-Torres expedition had deduced the existence of Torres Strait. He was ambitious to command the vessel that in fact sailed under James Cook in 1768, to his bitter disappointment. He had refused to sail in the capacity of astronomical observer, and later was led by his chagrin to attack Cook's integrity.

It was with this background of literary enthusiasm that in the seventh decade of the eighteenth century active steps were taken to elucidate the problem of Terra Australis Incognita. The most important contributions were made as a result of the first and second voyages of Cook, in the years 1768–71 and 1772–75 respectively; but it should not be forgotten that the immediately preceding efforts, those of Commodore John Byron, who sailed in 1764, of Samuel Wallis and Philip Carteret, who sailed in 1766, and of the Chevalier Louis-Antoine Bougainville, who sailed for France in the same year, were not lacking in heroic features and some useful results. All directed their efforts to the west and north-west of Cape Horn, and made circumnavigations.

It was the genius of Cook, an intensely practical genius, to pursue the same objective more doggedly, into higher, uncongenial latitudes, and to make full use of the potentialities of the late eighteenth century sailing ship. His success in maintaining the health of his crews by attention to diet, cleanliness, clothing and clean quarters; his skill as a navigator and especially as an explorer of potentially treacherous coastlines, acquired through years of experience in the Newfoundland region; his large measure of success in handling first contacts with strange peoples; his popularity with his men despite his strict discipline

—all these are well known. And Cook was well served by the Admiralty. The *Endeavour*, in which he left Deptford on July 30th, 1768, with 94 persons on board, was an adapted capacious Whitby collier, of 368 tons, and of shallow draught, admirably suited to coast reconnaissance.

The published statements conveyed that the motive was the conveyance of 'such persons as the Royal Society should think fit to appoint to observe the passage of the Planet Venus over the disk of the sun on the 3rd June, 1769, . . . to such place to the southward of the Equinoctial Line as should be judged proper. . . .' In fact this place was George III island (Tahiti), which had been discovered by Wallis. This accomplished, further secret instructions were to be followed, in relation to the southern continent.[4]

'If you discover the continent . . . you are to employ yourself diligently in exploring as great an extent of the coast as you can. . . . You are also carefully to observe the nature of the soil and the products thereof, the beasts and fowls that inhabit or frequent it, the fishes . . . in case you find any mines, minerals or valuable stones, you are to bring home specimens of each. . . . You are likewise to observe the genius, temper, disposition and number of the natives, if there be any, and endeavour by all means to cultivate a friendship and alliance with them. . . . You are also with the consent of the natives to take possession of convenient situations in the country, in the name of the King of Great Britain; or if you find the country uninhabited, take possession for His Majesty by setting up proper marks.'

The *Endeavour* left Rio de Janeiro on December 28th, 1768 and proceeding via Tierra del Fuego reached Tahiti on April 13th—Cook later wrote, from Batavia, on October 23rd, 1770:

'It was the 13th July before I was ready to quit this island, after which I spent near a month exploring some other islands which lay to the westward before we steered to the southward . . . we arrived in the latitude of 40° 12′ south without seeing the least signs of land. After this I steered to the westward, between the latitude of 30° and 40°, until the 6th of October, on which day we discovered the east coast of New Zealand, which I found

to consist of two large islands. . . . On the 1st April 1770 I quitted New Zealand and steered to the westward until I fell in with the east coast of New Holland, in the latitude of 38° south. I coasted the shore of this country to the north . . . until we arrived in the latitude of 15° 45′ south when . . . we struck upon a reef of rocks, where we lay twenty-three hours and received considerable damage . . . we were obliged to take shelter in the first port we met with . . . and after all put to sea with a leaky ship, and afterwards coasted the shore to the northwards through the most dangerous navigation that ever perhaps the ship was in . . . in the latitude of 10° 30′ south we found a passage into the Indian Sea, between the northern extremity of New Holland, and New Guinea. . . .'

Cook reached Batavia on September 10th, 1770, having thus with great skill and great good fortune escaped from the hazards of the Great Barrier Reef, off the eastern coast of Australia, to sail through Torres Strait. The health record of the voyage was marred at Batavia and on the return (via the Cape of Good Hope) by dysentery: of the 94 persons who sailed only 56 returned to the Downs on July 13th, 1771.

James Cook in the Journal of this voyage appends to his entries for March 1770 an account of New Zealand. In the course of this he raises the question of the 'Origin or Source' of the inhabitants:

'It certainly be neither to the Southward nor Eastward, for I cannot perswaide myself that ever they came from America; and as to a Southern Continent, I do not believe any such thing exist unless in a high Latitude. But as the Contrary opinion hath for many Years prevail'd, and may yet prevail, it is necessary I should say something in support of mine more than what will be directly pointed out by the Track of this Ship in those Seas; for from that alone it will evidently appear that there is a large space extending quite to the Tropick in which we were not, or any other before us that we can ever learn for certain. . . . Here is now room enough for the North Cape of the Southern Continent to extend to the Northward, even to a pretty low latitude. But what foundation have we for such a supposition? None, that I know of, but this, that it must be either here or no where. Geographers have indeed laid down part of Quiros' discoveries in this Long., and have told us that he had these signs of a continent, a part of which they

have Actually laid down in the Maps; but by what Authority I know not. Quiros, in the Latitude of 25° or 26° S., discover'd 2 islands, which, I suppose, may lay between the Long. of 130° and 140° W. Dalrymple lays them down in 146° W., and says that Quiros saw to the Southward very large hanging Clouds and a very thick horizon, with other known signs of a Continent. Other accounts of their Voyage says not a word about this; but supposing this to be true, hanging Clouds and a thick Horizon are certainly no signs of a Continent,—I have had many proofs to the Contrary in the Course of this Voyage; neither do I believe that Quiros looked upon such things as known signs of land. . . . But the Voyage which seems to thrust it farthest back in the Long. I am speaking of, viz., between 130° and 150° W., is that of Admiral Roggeween, a Dutchman, made in 1722, who, after leaving Juan Fernandes, went in search of Davis's Island; but not finding it, he ran 12° more to the W., and in the latitude of 28½° discover'd Easter Island. . . . I find it impossible to lay down Roggeween's rout with the least degree of accuracy. . . .'

Cook goes on to point out that

'there is left but a small space to the Northward of 40° where the grand object can lay. I think it would be a great pity that this thing, which at times has been the Object of many Ages and Nations, should not now be wholy be clear'd up; which might very Easily be done in one Voyage without either much trouble or danger or fear of Miscarrying, as the Navigator would know where to go to look for it; but if, after all, no Continent was to be found, then he might turn his thoughts towards the discovery of those Multitudes of Islands, which, we are told, lay within the Tropical regions to the South of the Line. . . .'[5]

Joseph Banks, the wealthy naturalist who sailed with Cook, refers briefly to the idea of a southern continent in his Journal of the voyage; the entry is dated March 20th, 1769, and was written some two months after leaving Tierra del Fuego:

'When I look on the charts of these seas, and mark our course which has been nearly straight at N.W. since we left Cape Horn, I cannot help wondering that we have not yet seen land. It is, however, some pleasure to be able to disprove, that which only exists in the opinion of theoretical writers, as are most of those

who have written anything about these seas without having themselves been in them. They have generally supposed every foot of sea over which they believed no ship to have passed to be land, although they had little or nothing to support that opinion, except vague reports, many of them mentioned only as such by the authors who first published them. . . . To strengthen these weak arguments another theory has been started, according to which as much of the South Sea as its authors call land must necessarily be so, for otherwise this world would not be properly balanced, since the quantity of earth known to be situated in the northern hemisphere would not have a counterpoise in this. The number of square degrees of their land which we have already changed into water sufficiently disproves this. . . .'

At the end of March in the following year the great naturalist describes how 'a consultation was held, and three schemes proposed,' after New Zealand had been circumnavigated and found 'not as generally supposed, part of a continent, but two islands.' The proposal to return by Cape Horn, which had to be dropped owing to the condition of the ship, would have perhaps led to the clearing up of the problem of the southern continent, the 'first grand object.'

'That a southern continent really exists I firmly believe; but if asked why I believe so, I confess my reasons are weak: yet I have a prepossession in favour of the fact which I find it difficult to account for.'

Banks goes on to suggest that the Royal Society should promote 'a voyage of mere curiosity,' to promote the increase of knowledge by seeking for the continent.[6]

Cook's second voyage was directed to searching for the southern continent, but it was not one of mere curiosity and Joseph Banks did not participate, owing to difficulty in meeting his expansive ideas of accommodation. The naturalists who did go were John Reinhold Forster and George Forster, father and son, and they were financed by the Admiralty. The main driving force was the desire for new fields for exploitation, and to anticipate rival French and Spanish efforts. The *Resolution* (462 tons) and the *Adventure* (336 tons), adapted colliers, left

Plymouth on July 13th, 1772, and arrived at the Cape on October 3rd.

It was while at the Cape that Cook and Furneaux (in command of the *Adventure*) heard of French efforts, Kerguelen and Marion du Fresne being active at this time; but neither the land reported by Bouvet, nor by Kerguelen, could be found, when the voyage was resumed. With subsequent details we are unable to deal in short space. It must suffice to note that during this voyage, which ended on July 29th, 1775, when Plymouth was regained, Cook, by use of the New Zealand base and sailing with the westerlies to make a circumnavigation in high latitudes, had demonstrated that there was no extensive southern continent in the climatically favoured latitudes of the southern hemisphere. In the course of a voyage of more than sixty thousand miles, during which only one life was lost by disease, the Antarctic circle had been crossed in three sectors. Icefields, fogs and gales had often made conditions hazardous; far to the south the realm of the petrel and the penguin had alone been found. The farthest south was 71° 10′ in 106° 54′ W. reached at the end of January 1774.

Cook concluded:

'I will not say it were an impossibility anywhere to get in among this ice but I will assert that the bare attempting of it would be a very dangerous enterprise and what I believe no man in my situation would have thought of. I who hope ambition leads me not only farther than any other man has been before me, but as far as I think it possible for man to go, was not sorry at meeting with this interruption.'

He thought that a continent, or extensive land area, existed near the South Pole, in view of the extensive ice and severe cold encountered, and that part of it had probably been seen; he considered that it extended farthest north to the south of the Atlantic and Indian Oceans.

On his third great voyage, in July 1776, Cook was bent on another quest, i.e., the Pacific approach to the north-west passage. He was killed in Hawaii on February 14th, 1779.

[1] Sir Napier Shaw, *Manual of Meteorology*, Volume I, 1926. The edition of *A New Voyage Round the World* referred to in this

chapter is that published by the Argonaut Press, with introduction by Sir Albert Gray, 1927. (Quotations from the works of W. Dampier, by courtesy of the Argonaut Press.)

[2] See his introduction to *A Voyage to New Holland*, Argonaut Press, 1939.

[3] Quoted by G. R. Crone and R. A. Skelton, in *Richard Hakluyt and His Successors*. Hakluyt Society, 1946.

[4] Quoted by Hugh Carrington, *Life of Captain Cook*, 1939.

[5] Quotations from *Captain Cook's Journal During His First Voyage Round the World*, edited by Admiral W. J. L. Wharton, 1893.

[6] Quotations from *Journal of the Right Hon. Sir Joseph Banks during Captain Cook's First Voyage in H.M.S. Endeavour*, 1768-71, edited by Sir Joseph Hooker, 1896.

10

THE EXPLORATION OF INTERIOR AFRICA

Large blank areas on the map of Africa, or sketchy outlines by imaginative cartographers, presented a challenge to explorers that was not, in fact, taken up in earnest until the late eighteenth century—despite the fact that the coastal outline had been completed by Portuguese navigators early in the Great Age of Discovery. Political and economic circumstances played a part, as well as geographical factors, in this long delay. Other parts of the world offered greater attractions than interior Africa. In that continent traffic at coastal points in gold and slaves brought from the interior by Africans, and the development of ports of call on the route to India, largely satisfied the aspirations of the Portuguese.

Exceptions there were, as in the activities of enterprising priests in Abyssinia and in the Congo basin, but they were few. Other Europeans came to the West African coast from the sixteenth century onwards, the English on the Gambia, and the French on the Senegal; in the seventeenth century and later they used these rivers to penetrate some way inland. The Dutch established themselves in Capetown in 1652, but not until 1760 was the Orange River crossed, and only after 1830 did exploration in South Africa become more sustained.

Not only did interior Africa offer little to attract, but there was much to repel, and the approaches to the unknown areas were difficult. Narratives of exploration make the difficulties clear; they include rivers interrupted by rapids, the tsetse fly fatal to transport animals over large areas, disease lurking in wet tropical lowlands, and the skill needed in travelling through tribal territory. Much resource and great tact were called for; willingness to alter a route and to abandon notions of speed; and mortality among African explorers has been high. Our consideration will be of their labours in the region of the Niger, the upper Nile, and east-central Africa, and we commence with the work of the African Association founded in 1788.

The first notable successes in the field of exploration that were directly due to the activities of the African Association were achieved by the Scottish surgeon Mungo Park, who was introduced to the association by Sir Joseph Banks, the president of the Royal Society. His objective was to ascertain 'the course and if possible the rise and termination of the Niger.' This problem, together with that of finding out the real character of the mysterious city of Timbuktu, was a subject of absorbing interest both to those who hoped for the solution of a geographical puzzle, and to those who saw in the Niger country a possible field of trade expansion.

Theories advanced by men like the French geographer Jean d'Anville (1697–1782) and the Englishman James Rennell (1742–1830) were essentially based on efforts to interpret ancient authors, on Arabic literature and especially on the voluminous *History and Description of Africa* written by Leo Africanus, a Moor of Granada. Leo travelled widely in the early sixteenth century and apparently visited the Sudan, so that his erroneous description of the Niger as rising in a lake in the desert and then flowing *westwards* to the Atlantic is difficult to explain. In the late eighteenth century many followed his views; while others held that the great river flowed eastwards to join the Nile, or at least eastwards until it became lost in a vast swamp to the south of the Sahara desert.

The story of Mungo Park's first journey is to be found in a work actually written (in a somewhat ornate style) by a professional writer, Bryan Edwards, secretary of the African

Association, on the basis of Park's notes.[1] The approach was from the Gambia region. Park set out from Pisania, a trading post about 200 miles up river, in the dry season, on December 2nd, 1795, having spent some months learning Mandingo, a language in use over a wide area, and in acquiring general information. His party was a small one: Park on horseback, an interpreter and a servant and two asses to carry his belongings. The latter included fowling pieces and pistols; beads, amber and tobacco to exchange for provisions; and 'an umbrella, a pocket sextant, a magnetic compass and a thermometer.' After surmounting a number of difficulties (he was held prisoner for some time) on July 20th, 1796, he approached the Niger at Sego:

'Just before it was dark, we took up our lodging for the night at a small village, where I procured some victuals for myself, and some corn for my horse, at the moderate price of a button; and was told that I should see the Niger (which the Negroes call Joliba, or *the great water*), early the next day. The lions are here very numerous: the gates are shut a little after sunset, and nobody allowed to go out. The thoughts of seeing the Niger in the morning, and the troublesome buzzing of musketoes, prevented me from shutting my eyes during the night; and I had saddled my horse, and was in readiness before daylight. . . . This happened to be a market day at Sego . . . we rode . . . through some marshy ground . . . looking forwards, I saw with infinite pleasure the great object of my mission; the long sought for, majestic Niger, glittering in the morning sun, as broad as the Thames at Westminster, and flowing slowly *to the eastward*. I hastened to the brink, and, having drank of the water, lifted up my fervent thanks in prayer. . . . The circumstance of the Niger's flowing towards the east . . . did not however excite my surprise; for though I had left Europe in great hesitation on this subject, and rather believed that it ran in the contrary direction, I had made such frequent enquiries during my progress, concerning this river; and had received from Negroes of different nations, such clear and decisive assurances that its general course was *towards the rising sun*, as scarcely left any doubt on my mind. . . .'

From Sego, Mungo Park rode seventy miles or so to Silla, also on the Niger, but decided he could go no further east. A

sick man, and destitute, he foresaw increasing difficulty in begging his way through districts that would be more and more under hostile Moorish influence as he progressed towards 'Tombuctoo'—although this town was but fourteen days' journey by land from Silla. Moreover, the rains had commenced and progress would be difficult. He gathered information about the town of 'Houssa' (Hausa) but

'of the further progress of this great river, and its final exitt, all the natives with whom I conversed seemed to be entirely ignorant. Their commercial pursuits seldom induce them to travel further than the cities of Tombuctoo and Houssa; and as the sole object of their journeys is the acquirement of wealth, they pay but little attention to the course of rivers, or the geography of countries . . . my informants agreed, that many of the Negro merchants who arrive at Tombuctoo and Houssa, from the eastward, speak a different language . . . even these merchants, it would seem, are ignorant of the termination of the river, for such of them as can speak Arabic, describe the amazing length of its course in very general terms; saying only, that they believe *it runs to the world's end.*'

Returning, Mungo Park reached Kamalia, a village in the basin of the upper Senegal, his skin 'yellow with sickness,' destitute and in rags. He was befriended by the leader of a slave caravan, who, when the rains were over and rivers fordable, made his way to the European posts on the Gambia in June 1797. While in Kamalia, Park suffered much from fever, only relieved by the advent of dry north-east winds. He sums up climatic conditions in an interesting fashion:

'The whole of my route, both in going and returning, having been confined to a tract of country bounded nearly by the 12th and 15th parallels of latitude, the reader must imagine that I found the climate in most places extremely hot. . . . About the middle of June, the hot and sultry atmosphere is agitated by violent gusts of wind, (called *tornadoes*) accompanied with thunder and rain. These usher in what is denominated *the rainy season*; which continues until the month of November. During this time, the diurnal rains are very heavy; and the prevailing winds are from the south-west. The termination of the rainy season, is likewise attended with

violent tornadoes; after which the wind shifts to the north-east . . . it produces a wonderful change in the face of the country. The grass soon becomes dry and withered; the rivers subside very rapidly, and many of the trees shed their leaves. . . .'

Mungo Park sailed again for West Africa on January 30th, 1805, on a mission sponsored by the Secretary of State for the Colonies, since there was lively interest in possibilities of trade and colonisation. Since returning from Africa he had learned Arabic, studied the use of astronomical instruments, practised medicine at Peebles, prepared a memoir on Niger exploration, and chafed at official dilatoriness with good cause. After his return James Rennell had written an appendix to the *Travels* in which he argued 'it can scarcely be doubted that the Joliba, or Niger, terminates in lakes in the eastern quarter of Africa and these lakes seem to be situated in Wangara and Ghana.' Park was prepared to sail the estimated 1,400 miles or so to Wangara from Sego, but preferred to believe that the Niger would, in fact, prove to be a tributary of the Congo, and that he would emerge at the mouth of the latter. This view postulated a breach by the river in the Kong mountains, a supposedly great east-west trending range in about 10° north, described by Leo and thought to be linked to the Mountains of the Moon, of the Ptolemaic map.

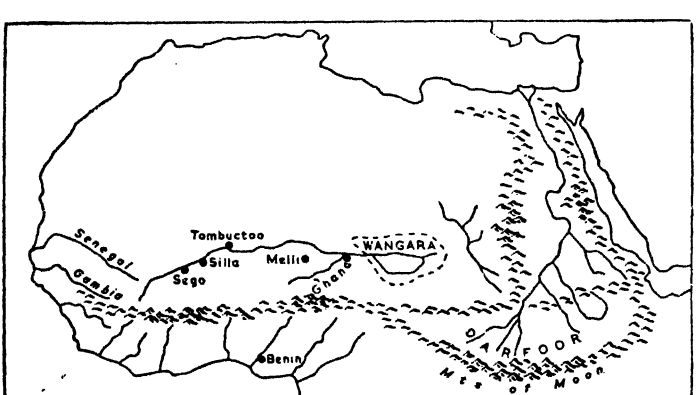

Fig. 7. Views of J. Rennell on the Niger Problem, 1798

Mungo Park's second journey was a tragic affair. He recruited soldiers from Goree (near modern Dakar), on the west African coast, but they proved a very poor form of support. The party of forty left Pisania on May 4th, 1805, and the leader hoped to travel as far as the Niger before the rains set in; in fact, Bambakoo was not reached until August 19th, with only eleven men still alive, and some of them ill. 'Your lordship will recollect that I always spoke of the rainy season with horror,' Park wrote to Lord Camden, after two months spent near Sego, and two days before his party of five surviving Europeans embarked on the so-called schooner *Joliba*. On this vessel, constructed in desperation from two old canoes, Park with one inefficient officer, three private soldiers (two were sick, one was mad), a guide, and three slaves embarked on a voyage to the ocean that would last, he conjectured, three months.

Subsequently it became known that the party met a tragic end about a thousand miles down stream at the Busa rapids, in an affray with natives; Barth, travelling in the Niger region some fifty years later, found that Park was still remembered, as a result, in Barth's view, of too ready recourse to firearms; he left in his wake a strong prejudice against Europeans.

Efforts to solve the Niger problem did not die with Mungo Park. An expedition was launched in two sections in 1816, which it was hoped would eventually link up. Captain J. H. Tuckey sailed up the Congo (Zaire) river, including in his party a botanist, a geologist, a naturalist, a comparative anatomist and 'a gentleman volunteer' and the crew numbered fifty. Forest and swamp and humid heat brought disaster, the voyage petered out and disease swept through the party. The other branch of the expedition under Major Peddie and Captain Campbell attempted an overland approach from the west coast but neither of the men returned, and the Niger was not reached.

It should be noted that although this enterprise was based on the theory that the Niger flowed into the Congo, the truth about its outlet had already been suggested in more than one quarter. As early as 1803 the German Reichard in the *Ephémerides Géographiques*, published in Weimar, had put

forward the theory that the Niger flowed into the Gulf of Guinea, and that the 'Oil Rivers' of the coast were in fact delta channels. James McQueen, a collector of information from every source, including negro slaves in the West Indies, put forward similar views in a treatise in 1816, and in 1821 again emphasised this explanation in a book discussing all Niger theories, and urging British expansion. Before the Lander brothers demonstrated the truth of these views Clapperton made an epic journey across the Sahara in another attempt to reach the Niger.

Two attempts had been made from Egypt and one from Tripoli, to approach the Niger, before Mungo Park and his murdered predecessor, Major Houghton, had used the Gambia route. In the 1820's the trans-Saharan route was again favoured since political conditions on the north African coast favoured the British. Captain Hugh Clapperton, R.N., Dr. Denham, R.N. and Dr. Oudney, together with a shipwright named Hillman, landed in Tripoli in November 1821 and left Murzuk a year later. They crossed the Sahara in two months, with an Arab escort, and in company with merchants and freed slaves. Not until September 1824 did the survivors, Clapperton and Denham commence their return from the Sudan, having meantime reached Lake Chad and proved that the Niger did not flow into it. Clapperton travelled extensively in the Sokoto area; in Kano he was told that the Niger had its outlet in the sea in Yoruba, while Denham was told, while in Bornu, that the river flowed eastwards into the Nile.

Clapperton in 1825 endeavoured to reach the Niger from the Guinea coast. Busa was reached, but the sole survivor of this expedition was Clapperton's servant Richard Lander. Lander returned with his brother John, and the two men reached Busa by travelling inland from the coast at Badagry; they sailed down to the sea in November 1830, thus earning a government reward of £100 and satisfying, for most people, curiosity about the Niger river.

Already in 1827 a Frenchman Réné Caillie had reached the mysterious city of Timbuktu, and unlike Gordon Laing who had been murdered in 1826 just after reaching the objective, he returned to tell his story and dispel a romantic legend. Thus

interest in the Niger river rapidly waned and the Royal Geographical Society absorbed the African Association. The outstanding contribution to knowledge of north-west Africa made by the German Henry Barth in his travels in the years 1850–55 attracted little public attention, although his narrative is by general agreement the most important single work on this region.[2]

It was through Carl Ritter, who is to be regarded as only equal to Alexander von Humboldt as an architect of modern geography, that Barth, a lecturer in geography at the University of Berlin, received an invitation to join an English expedition organised by Lord Palmerston. James Richardson, who like the young German geologist Overweg, also in the party, died in west Africa, was leader of an expedition that was designed to increase geographical knowledge and also to explore trade possibilities. Barth had already travelled in Barbary and in Arab lands further east, owing much to the help of British consuls, and he was an admirer of 'the wide extension of the British over the globe, their influence, their language and their government.'

He alone returned to Tripoli in August 1855, having set out with his party in February 1850, crossed the Sahara twice, explored previously unknown areas in the middle Niger region between Timbuktu and Say, and travelled in the upper Benue region. A boat carried overland, to 'the wonder and astonishment of the tribes in the interior,' was finally launched on Lake Chad. Barth dressed as an Arab and conformed to the 'innocent prejudices' of the people he travelled with; he ascribed much of his success to his custom of giving alms. Although he was in sympathy with the British policy of hostility to the slave trade he was forced at times, like other African explorers, to travel with participants in the traffic. Barth sums up his task in the preface of his work in these terms:

'. . . it will be found that the maps made by me on the journey, under many privations, were a close approximation to the truth . . . all that pertains to physical features and positions has been laid down, and executed with artistic skill and scientific precision, by Dr. Petermann.

'The principal merit which I claim for myself in this respect is that of having noted the whole configuration of the country; and my chief object has been to represent the tribes and nations with whom I came in contact, in their historical and ethnographical relation to the rest of mankind, as well as in their physical relation to that tract of country in which they live. If, in this respect, I have succeeded in placing before the eyes of the public a new and animated picture, and connected those apparently savage and degraded tribes more intimately with the history of races placed on a higher level of civilisation, I shall be amply recompensed for the toils and dangers I have gone through.'

We now turn from the Niger to another great African river. Sir Harry Johnston in an appendix to his work on the exploration of the Nile lists in chronological order the participants in modern times, including only those 'who added definitely and markedly to the map of the Nile basin.'[3] There are 76 names and in terms of nationality 34 British, 10 Germans, 13 French, 4 Italians, 3 Portuguese, 2 Dutch, 2 Belgians, 2 Americans, 2 Swiss, 3 Austro-Hungarians and one Turk. Chronologically the Portuguese head the list; and it was Pedro Paez, a Jesuit missionary, who saw the source of the Blue Nile in 1613.

Fourth in the list is James Bruce, who commenced extensive travels in 1768 and visited the Blue Nile sources; in Dr. Heawood's words 'He flattered himself that he had thus solved the ancient mystery of the Nile sources.' In fact only part of the problem was solved and, on his return via Paris, d'Anville was able to convince him that the Portuguese had forestalled him even in this. None the less, Bruce's work created much interest in African exploration; his account in five volumes appeared in 1790, and although received with incredulity in some quarters has been called 'a faithful record of a well executed scientific expedition.'[4]

The contributions of numerous explorers in later years must be passed over until the period of major achievements was reached. This was initiated by discoveries made by two German missionaries who had transferred their labours from Abyssinia to Mombasa and had there heard stories from negroes and from Arab traders, of mountains and lakes in the interior. In 1848 John Rebmann discovered Mt. Kilimanjaro

and in 1849 Ludwig Krapf saw Mt. Kenya; moreover stories were heard of a large lake in the interior.

Interest in Ptolemy's lake sources of the Nile and the

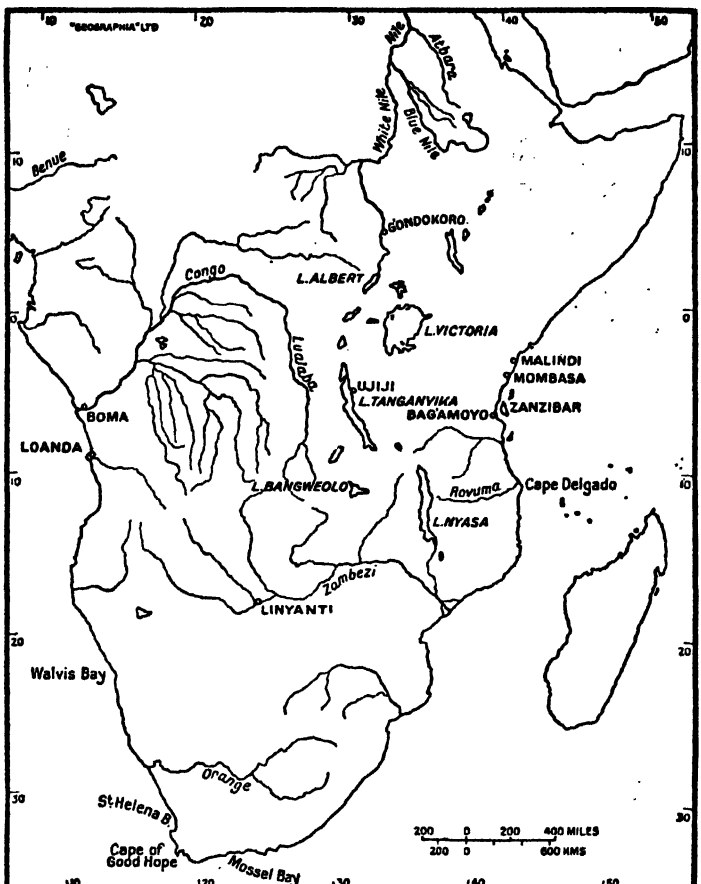

Fig. 8. Rivers and lakes of Central Africa

Mountains of the Moon became strong and a period of activity began with the efforts of Richard Francis Burton (who had already made a journey to Mecca as a pilgrim) and John

Hanning Speke both Indian Army officers and the latter a surveyor and naturalist. Their first venture, a journey to Somaliland, partly designed to learn something of a country of interest to the Aden garrison to which they belonged, partly as an approach to the upper Nile, ended in fiasco. Their next expedition was productive of important results, and also of lasting discord between the two men.

When Burton and Speke reached Zanzibar late in 1856 they were being financed mainly by the Royal Geographical Society with some assistance from the East India Company and the Foreign Office. They proceeded from Bagamoyo, on the mainland coast, inland by an Arab trade route, to Ujiji, a post on Lake Tanganyika, which they thus discovered early in 1858. Burton suffered much from fever and Speke went alone to follow up an Arab story of a large lake—he found Victoria Nyanza. When he returned with his story Burton reacted with anger to his suggestion that Victoria Nyanza was the main source of the Nile and thus more important than Lake Tanganyika. Both men reached Zanzibar in March 1859. Speke made severe criticisms of Burton when he returned to England and in later years Burton replied, and argued that in fact Speke's magnificent lake was but a series of swamps; moreover, said Burton, Lake Tanganyika had an outlet to the north, to the Albert Nyanza discovered by Samuel Baker in 1864.

Speke returned to East Africa to investigate Victoria Nyanza in 1860, this time accompanied by James Augustus Grant, whom he had first met while hunting in India, and who on this expedition made a collection of plants, later 'arranged at Kew by Dr. Thomson and highly commended by Dr. Hooker.' Quite apart from problems of Nile drainage, Speke and Grant collected much information about Uganda and its inhabitants, people of relatively high attainments.[5]

On July 28th, 1862 Speke had seen the Ripon Falls where the Nile left Victoria Nyanza:

'At last with a good push for it, crossing hills and threading huge grasses, as well as extensive village plantations lately devastated by elephants—we arrived at the extreme end of the journey.

We were well rewarded; for the "stones," as the Wananda call the falls, was by far the most interesting sight I had seen in Africa. Everybody ran to see them at once, though the march had been long and fatiguing, and even my sketch block was called into play. Though beautiful, the scene was not exactly what I expected; for the broad surface of the lake was shut out from view by a spur of hill, and the falls, about 12 feet deep, and 400 to 500 feet broad, were broken by rocks. Still, it was a sight that attracted one to it for hours—the roar of the waters, the thousands of passenger-fish, leaping at the falls with all their might, the Wasoga and Waganda fishermen coming out in boats and taking post on all the rocks with rod and hook, hippopotami and crocodiles lying sleepily on the water, the ferry at work above the falls. . . .

'The expedition had now performed its functions. I saw that old father Nile without any doubt rises in the Victoria Nyanza. . . .'

Speke goes on to state 'I had seen full half of the lake, and had information given me of the other half, by means of which I knew all about the lake, as far, at least, as the chief objects of geographical importance were concerned.' Sir Harry Johnston is critical of Speke's 'elementary notions about hydrography. He gives the Victoria Nyanza something like four principal outlets, much as the Portuguese in earlier days provided lakes in the centre of Africa which fed impartially the Congo, the Nile and the Zambesi.'

Speke and Grant returned to England, where they arrived in the spring of 1863, via Khartum and Cairo, having proceeded north to Gondokoro, on the White Nile, where they were met by Samuel Baker in February 1863. Baker, a traveller and explorer 'famed for his sports in Ceylon,' with his Hungarian wife,

'had come up with three vessels . . . fully equipped with armed men, camels, horses, donkeys, beads, brassware, and everything necessary for a long journey . . . hoping, as he jokingly said, to find us on the equator in some terrible fix, that he might have the pleasure of helping us out of it. . . . Nobody had even dreamt for a moment that it was possible we would come through. . . .'

Speke accidentally shot himself after his return, while out partridge shooting shortly before he was due to debate with

Burton his views on the Nile sources, at a meeting of the British Association in Bath in 1864.

The Bakers themselves set out from Khartum on a two year journey of exploration in March 1863 and on March 14th, 1864, saw Albert Nyanza, a lake which Speke and Grant had heard reports of under the name of 'Luta Nzige'; the Bakers exaggerated its size, but the discovery was an important reward of an extremely dangerous and exhausting journey on which also the Murchison Falls on the Victoria Nile were seen. Unlike Speke, Baker was rewarded on his return to England, receiving a knighthood. On the subject of the lake, under an entry for March 14th, Baker wrote:

'The sun had not risen when I was spurring my ox after the guide, who, having been promised a double handful of beads on arrival at the lake, had caught the enthusiasm of the moment. The day broke beautifully clear, and having crossed a deep valley between the hills, we toiled up the opposite slope. I hurried to the summit. The glory of our prize burst suddenly upon me! There, like a sea of quicksilver, lay far beneath the grand expanse of water,—a boundless sea horizon on the south and south-west, glittering in the noon-day sun; and on the west at fifty or sixty miles, distance, blue mountains rose from the bosom of the lake to a height of about 7,000 feet above its level.'[5]

and later in his narrative,

'It was a grand sight to look upon this vast reservoir of the mighty Nile, and to watch the heavy swell tumbling upon the beach, while far to the south-west the eye searched as vainly for a bound as though upon the Atlantic. It was with extreme emotion that I enjoyed this glorious scene. . . . Here was the great basin of the Nile that received *every drop of water*, even from the passing shower to the roaring mountain torrent that drained from Central Africa towards the north. This was the great reservoir of the Nile!'

Despite the confident exposition of their claims by Burton, Speke, Grant and Baker there were those who regarded the Nile problem as still presenting a great challenge, notably the

botanist Schweinfurth, and the missionary-explorer Livingstone. George Schweinfurth set out from Khartum early in 1869 and travelled in the region of the Bahr-el-Ghazal and its tributaries, considering that this source of water supply to the lower Nile had been unduly neglected; his travels extended to the Welle river to the south of the Congo-Nile water parting. It was David Livingstone who wrote in his journal on May 31st, 1872, a comment on the statement made by Baker and quoted above on Albert Nyanza—'How soothing to be positive.' We must examine the background to this comment, made after years of search for the sources of the Nile, far to the south of the Victoria and Albert Lakes.

David Livingstone's discovery of Lake 'Ngami in 1849 has been described as opening a new epoch in the history of central Africa.[7] Sir Reginald Coupland has written of him:

'Within ten years . . . of his first arrival in the South African mission field in 1841, he ceased to be a missionary in the normal sense of the word. He still prayed and preached as he went his way. He believed that what he was doing was the best he could do to promote the spread of Christianity in Africa. But his primary task, his immediate objective, was not evangelism and conversion. He had become in the first place an explorer.'[8]

It was on reaching the Zambesi in June 1851 that Livingstone conceived his great project, carried out in the years 1852–56, of crossing the continent:

'if the slave market were supplied with articles of European manufacture by legitimate commerce, the trade of slaves would become impossible. . . . I at once resolved to save my family from exposure to this unhealthy region by sending them to England, and to return alone, with a view to exploring the country in search of a healthy district that might prove a centre of civilisation, and open up the interior by a path to either the east or west coast.'[9]

Before leaving the Cape for the north, in June 1852, Livingstone strengthened his astronomical knowledge there with the help of the Astronomer Royal, and was thus able to determine accurately his position at intervals on his travels.

Livingstone set out for the west coast from Linyanti in Central Africa, in approximately 18° 24′ N., in November 1853, accompanied only by 27 Africans:

'not hired, but sent to enable me to accomplish an object as much desired by the chief and most of his people as by me. They were eager to obtain free and profitable trade with white men. . . . The desire of the Makololo for direct trade with the sea coast coincided exactly with my own conviction, that no permanent elevation of a people can be effected without commerce.'

He reached Loanda, in Portuguese territory, in May 1854, sick and fatigued by an arduous journey:

'. . . though I had reached the coast, I had found that in consequence of the great amount of forest, rivers, and marsh, there was no possibility of a highway for wagons, and I had brought a party of Sekeletu's people with me, and found the tribes near the Portuguese settlement so very unfriendly, that it would be altogether impossible for my men to return alone. I therefore resolved . . . to take back my Makololo companions to their chief, with a view of trying to make a path from his country to the east coast by means of the great river Zambesi or Lecambye.'

Leaving Loanda on September 20th, 1854, the party returned to the region from which they had started, arriving in September of the following year.

'Having found it impracticable to open up a carriage path to the west, it became a question as to which part of the east coast we should direct our steps. The Arabs had come from Zanzibar through a peaceful country . . . but my present object being a path admitting of water rather than land carriage, this route did not promise so much as that by way of the Zambesi. . . . The Makololo knew all the country eastwards as far as the Kafue . . . and they all advised this path in preference to that by the way of Zanzibar. The only difficulty that they assured me of was that in the falls of Victoria.'

Linyanti was left on November 3rd, and Kilimane reached on May 20th, 1856, 'two healthy ridges' being discovered on the way; and as to the Zambesi,

'the river had not been surveyed, but at the time I came down there was abundance of water for a large vessel and this continues to be the case during four or five months of each year. The months of low-water still admit of navigation by launches. . . . If a steamer were sent to examine the Zambesi, I would recommend one of the lightest draught, and the months of May, June and July for passing through the delta. . . .'

Thus despite breaks in navigation Livingstone had great hopes of this approach to central Africa and he hoped for 'a chain of stations admitting of easy and speedy intercourse' with the higher and therefore healthier parts of the interior. The Zambesi expedition of 1858–63 proved his hopes to be founded on illusions.

The lower Zambesi region had in fact long been known to the Portuguese, who, working inland from the coast, had established the river post of Sena as early as 1531, and others later. By the time Livingstone was interesting himself in the zone the sphere of Portuguese activity had contracted; none the less there was naturally suspicion of the activities of such a fearless opponent of the slave trade, one moreover who thought the best move towards its abolition would be the establishment of British posts and British trade in the interior highlands.

More serious obstacles, however, arose to make the immediate results of the government-sponsored expedition to the Zambesi in the years 1858–63 a source of bitter disappointment to the leader. There were in fact no easy river highways into the interior and, although the Shiré highlands have since shown their capacity to support a white population, the approaches through disease-infested tropical lowlands exacted a heavy toll from pioneer travellers. Shoals were an ever recurring difficulty and the Kebrabasa rapids on the Zambesi and the Murchison cataracts on the Shiré (which Livingstone followed to explore part of Lake Nyasa) like the shoals and rapids of the Rovuma river which entered the sea north of the Zambesi outlet, proved too much for the river craft employed, small though they were—and an endless source of vexation.

As to disease, Dr. Kirk wrote in his diary: 'Bad health and

a touch of fever is nothing, were it not for the bad humour it puts anyone in, and sickness is a thing with which the Doctor has no patience either in himself or anyone else.'[10] Personal dissensions reached serious proportions in a party that initially included Charles Livingstone, as general assistant, expert on cotton, and 'moral agent,' John Kirk as physician and economic botanist, Richard Thornton as geologist, and two other white men. Livingstone's genius in handling Africans did not extend to the handling of affairs involving white colleagues. His next effort in Africa was dominated geographically by the desire to find the sources of the Nile, perhaps not far to the west of Lake Nyasa, and he decided that he would travel without white companions.

Landing on the east coast in April 1866 Livingstone followed the Rovuma valley to Lake Nyasa, journeyed northwards to the southern end of Lake Tanganyika (April 1867), and proceeded on to Lakes Mweru (November 1868) and Bangweolo (July 1868); after a return to Ujiji (March–July 1869) he set out once more and reached the Lualaba river at Nyangwe in March 1871—'A mighty river at least 3000 yards broad, and always deep.' Was this the Nile? To his great chagrin he was unable to follow up his discovery. In July he wrote, 'I tried to go down Lualaba, then up it, and west . . . I see nothing for it but to go back to Ujiji for other men'; lacking suitable men and transport, depressed by the horrors of the slave trade, Livingstone returned to Ujiji. Not until August 1872 did he set out once more, as he thought, to solve the problem of the Nile sources; with supplies and men sent from the coast by his rescuer, Stanley. For some time he had been attracted by a story told by Herodotus, who had it from a scribe of Sais in Egypt. This was to the effect that from between the mountains of Crophi and Mophi, situated between Syene and Elephantine, flowed the bottomless sources of the Nile: the waters divided, half flowing north to Egypt and half south to Ethiopia.

Livingstone had heard a story of a hill near Katanga from which four rivers rose in fountains, and he saw in this the origin of Herodotus's story. He wrote in February 1872:

'It is all but certain that four full grown gushing fountains rise on the watershed eight days south of Katanga, each of which at no great distance off becomes a large river; and two rivers thus formed flow north to Egypt, the other two south to Inner Ethiopia. It may be that these are not the fountains of the Nile mentioned to Herodotus . . . but they are worth discovery, as in the last hundred of the seven hundred miles of the watershed, from which nearly all the Nile springs do unquestionably arise . . . I propose to go . . . round the south end of Tanganyika . . . then across the Chambeze and round the south of Lake Bangweolo, and due west to the ancient fountains. . . . This route will serve to certify that no other sources of the Nile can come from the south without being seen by me. No one will cut me out after this exploration is accomplished. . . .'[11]

In April 1872 he recorded his view that Herodotus was to be preferred to Ptolemy; clearly the latter lent support to the views of Speke, Grant and Baker, rather than to those of Livingstone. But he was uncertain and in May he wrote in his Journal:

'In reference to this Nile source I have been kept in perpetual doubt and perplexity. I know too much to be positive. Great Lualaba . . . may turn out to be the Congo and Nile, a shorter river after all—the fountains flowing north and south seem in favour of its being the Nile. Great westing is in favour of the Congo. It would be comfortable to be positive like Baker. . . .'

In August 1872 Livingstone set out on the route he had already outlined but died on April 30th, 1873 in the area south of Lake Bangweolo. He had hoped to prove that the Lualaba was the Nile, that it was fed by Lake Bangweolo, and that the streams that fed this lake from the south were sustained by the fountains. On April 6th he had written:

'The whole country south of the Lake was covered with water, thickly dotted over with lotus leaves and rushes. It has a greenish appearance . . . it is quite impossible at present to tell where land ends, and Lake begins; it is all water, water everywhere. . . . It is the Nile apparently enacting its inundations, even at its sources.'

Livingstone succumbed to the African environment that he

had defied for many years, repeated illness at last undermining his phenomenal physical strength.

The 'finding' of Livingstone by Stanley in November 1871, at Ujiji, is perhaps the best known incident in nineteenth-century African exploration. Livingstone, although not 'lost' in any real sense, had arranged for supplies at Ujiji and had been the victim of duplicity; suffering privation, reluctant to become dependent on Arab generosity, as he had indeed been at times in the past, he was 'reduced to a skeleton':

'when my spirits were at their lowest ebb, the good Samaritan was close at hand. . . . The American flag at the head of a caravan told me of the nationality of the stranger. Bales of goods, baths of tin, huge kettles, cooking pots, tents etc. made me think "This must be a luxurious traveller, and not one at his wits' end like me." . . . It was Henry Moreland Stanley, the travelling correspondent of the New York Herald . . .'

H. M. Stanley had already had an adventurous career; born at Denbigh in 1841 he had spent part of his childhood in a workhouse, had run away to sea, been adopted by an American, fought in the Civil War for both south and north in turn, and at this time was a restless and enterprising journalist. He passed as an American citizen but was so only by naturalisation and for the seven years 1885–92. When Stanley met Livingstone he was collecting news for a sensational newspaper and when he returned to England there was great controversy about his veracity and other matters. Before he had left Livingstone in March 1872 he had sailed with him to the north of Lake Tanganyika (November 16th–December 13th, 1871) and ascertained that no river flowed out to the north, towards Lake Albert.

After some years of journalistic activity and lecturing, on hearing of the death of Livingstone, Stanley decided to take up African exploration in earnest. Stanley was fearless, had great powers of organisation, a keen business sense, and was impatient with African dilatoriness and opposition—he revealed his character in his voluminous writings—as to Africans 'the savage only respects force, power, boldness, and

decision.' There could be no greater contrast with the views of David Livingstone.

Stanley was the leader of two further important African expeditions. The first was financed by the *Daily Telegraph* and the *New York Herald* and took place during the years 1874–77. A start was made from Bagamoyo with 356 followers and 8 tons of equipment; a wooden barge was carried in five sections. This latter craft, the *Lady Alice*, was put to good use; it was used for the circumnavigation of Victoria Nyanza in 1875, a voyage which vindicated the claims made by Speke, and for sailing on Lake Tanganyika. After following the Luama valley to the Lualaba, Stanley launched the *Lady Alice* on this stream in November 1876, and using canoe transport in addition followed what in fact he proved to be the Congo to Isagila or 'Tuckey's farthest.' Portages were involved both at the Stanley and at the Livingstone Falls. From Isagila a march was made to Boma, a post from which help was sent to the party now in desperate straits; of the four white men who started from Zanzibar only Stanley survived, and of the followers, only 115. Stanley followed up his discovery by working in the interests of King Leopold II of Belgium and, as a result of a stipulation made by this monarch, his journey to relieve Emin Pasha began on the Congo and not at Zanzibar.

The Emin Pasha relief expedition effectively commenced its work when Stanley, with four white officers and 384 natives, left Yambuya on the Aruwimi river, a point reached by steamer up the Congo, in June 1887, bound for a point on the south-west shore of Lake Albert, some 550 miles to the east. The expedition was financed by public subscription in order to bring succour to Emin Pasha, who was in fact the German explorer and administrator Schnitzer, employed by an Egyptian government official under General Gordon, and isolated by a combination of circumstances in 'Equatoria.' With the vicissitudes of this expedition, which ended with the arrival of Stanley and Emin Pasha and a column of no less than 1,500 people at Bagamoyo on December 4th, 1889, and with the storm of controversy that later arose over the tragic fate of a supporting party left at Yambuya, we are not concerned. We must note, however, that the march eastwards to Lake Albert

lasted nearly six months and that the stretches of equatorial forest traversed provided probably the most difficult travel terrain ever experienced by an African explorer; that the Ruwenzori range was discovered, Edward lake explored and the Semliki river followed in its course to that lake. Sensational though this expedition was, Stanley's second journey (1874–77) had more historical significance; its outcome was a great impetus to the partition of Africa:

'Stanley's second journey was in fact, in its results if not in its original intention the first of the new political expeditions ("imperialist," if you will). Its brutal attitude to hostile or puzzled African chiefs, its lavish equipment, its huge array of porters, the ruthless discipline under which they were kept, would have amazed and often horrified Lander, or Livingstone, or Speke. . . .'[12]

[1] Mungo Park, *Travels in the Interior Districts of Africa*, 1799.
[2] Henry Barth, *Travels and Discoveries in North and Central Africa*, 5 volumes, 1857.
[3] Sir Harry Johnston, *The Nile Quest*, 1903.
[4] E. Heawood, *A History of Discovery in the Seventeenth and Eighteenth Centuries*, 1912. This work is still of the greatest value.
[5] See J. H. Speke, *Journal of the Discovery of the Source of the Nile*, 1863.
[6] S. Baker, *The Albert N'Yanza, Great Basin of the Nile*, 1866.
[7] J. N. L. Baker, *A History of Geographical Discovery and Exploration*, 2nd edition, 1937. An indispensable work.
[8] Sir Reginald Coupland, *Livingstone's Last Journey*, 1945.
[9] D. Livingstone, *Missionary Travels and Researches in South Africa*, 1859.
[10] Quoted in R. Coupland, *Kirk on the Zambesi*, 1928.
[11] H. Walker (editor), *The Last Journals of David Livingstone in Central Africa*, 2 volumes, 1874.
[12] See the introduction to M. Perham and J. Simmons, *African Discovery: an Anthology of Exploration*, 1942.

11

POLAR EXPLORATION

In our consideration of the search for northern passages to Cathay, we have already been concerned with the opening phase of the history of polar exploration. This chapter is con-

cerned with developments which began in the late eighteenth century, when the Antarctic zone also featured in the story. Antarctic history is a good deal simpler than Arctic, but even so only leading events can be noted, and more especially in relation to the Ross Sea sector.

So far as the Arctic is concerned the topics considered are the renewed search for the north-west passage, marred by the Franklin tragedy, the sequence of attempts to reach the North Pole by the Smith Sound approach, and the contributions to the technique of polar travel made by Nansen and Stefansson. The circumstances of A. E. Nordenskiöld's triumph in the north-east, discovery and partial survey of islands in the Eurasiatic Arctic, exploration of coastal and interior Greenland, work in the Canadian archipelago, these and other topics must be passed over; the subjects are too large, the literature too extensive. Andrew Croft points out that between the two World Wars nearly 50 parties from the British Isles alone (mainly from the universities of Oxford and Cambridge) visited the Arctic, Spitsbergen and Greenland being particularly favoured.[1] In the same period work associated with the name of Professor Otto Schmidt and organised in the U.S.S.R. has been carried out on a large scale. Not only have economic and strategic considerations led to much activity but problems of geology, land forms, flora and fauna, oceanography, climatology, meteorology (the latter particularly in relation to flying), all have attracted scientific workers, and much of the results is to be found in such periodicals as the *Geographical Journal* (Royal Geographical Society) and the *Polar Record* (Scott Polar Research Institute).

Daines Barrington, a lawyer who was keenly interested in natural history, presented views which showed great, if somewhat uncritical enthusiasm, to the Royal Society in 1773, and that learned body urged the Admiralty to seek a 'passage by or near the North Pole to the East Indies,' with a view to the promotion of 'natural knowledge.' C. Phipps and S. Lutwidge did in fact, in 1773, follow the edge of the Arctic icefields from Spitsbergen to Novaya Zemlya and reached 80° 48′ N. From the Pacific approach also important efforts were made. James Cook on his third voyage in 1778 could find no entry to Arctic

seas other than Bering Strait, a strait first entered fifty years earlier by Vitus Bering, a Dane in Russian employ. François de La Pérouse failed to find a passage with an outlet to the Pacific coast of North America in 1786, and the thorough George Vancouver likewise, in 1792.

There followed a period in which the activities of naval men were focused on warfare, and it was only after its conclusion with the Treaty of Paris in 1815, that ships and men again became available for polar exploration. There was renewed interest in the work of Baines—long after his death his papers were published, in 1818, under the title *Possibility of Approaching the North Pole*. Moreover it was believed that ice conditions, known to fluctuate in severity, were exceptionally favourable.

A whaler, William Scoresby, in the habit of making annual voyages to Greenland waters, reported to Sir Joseph Banks, after returning from a voyage in 1817, that large areas in the north were free from ice. The Secretary to the Admiralty, Sir John Barrow, active in the promotion of polar expeditions until his retirement in 1845, at the age of 81, was convinced of the existence of an open polar sea and was in fact much more optimistic than Scoresby. In 1818 a commission evolved a scale of financial rewards, elaborating a system that had commenced with an Act of Parliament in 1745. The reward for passing 110° W. within the Arctic Circle, or reaching the mouth of the Coppermine river was to be £5,000; for passing 130° W. or reaching the mouth of the Mackenzie, £10,000; for reaching 150° W. £15,000, and for arriving in the Pacific, £20,000. The mouth of the Coppermine had been reached by overland journey by Samuel Hearne in 1771, and Alexander Mackenzie had reached the mouth of the river named after him, in 1789. As to farthest north achieved, the scale was less generous; the passing of 83° N. was to be rewarded by £1,000 and at the other end of the scale, the passing of 89° N. by £5,000.

In the year 1818 expeditions were launched. David Buchan sailed in an attempt to reach the North Pole, actually getting no further than 80° 34′ N. in the vicinity of Spitsbergen. John Ross sailed to Baffin Bay and entered Lancaster Sound, but wrongly thought further progress to be barred by what he

called the 'Croker Mountains'. In fact, in the following year W. E. Parry sailed through Lancaster Sound to Barrow Strait and on to Melville Island, where he wintered—and in due course received the reward of £5,000.

The outcome of the expeditions that followed before the great landmark of the Franklin expedition of 1845, must be briefly summarised. Parry discovered Fury and Hecla Strait, to the north-west of Hudson Bay in 1821, and made another effort in Lancaster Sound in 1824; Beechey in 1825 entered Bering Strait from the Pacific and penetrated to Point Barrow; John Ross and his nephew James Clarke Ross in 1829 entered Prince Regent Inlet, reached Boothia, later made a number of sledge journeys including one to the magnetic pole, and after successfully spending four winters in the Arctic was picked up, with his men, by a whaler in Lancaster Sound. In and after 1819 important journeys were made overland to the Arctic coast of North America, continuing the work of Hearne and Mackenzie, and much had been achieved by 1845 by John Franklin (who had sailed with Buchan in 1818), George Back, John Richardson, E. N. Kendall and the Hudson Bay Company's servants Thomas Simpson, Peter Dease and John Rae.

The Franklin expedition of 1845 is outstanding not for what was achieved, but because it was a tragic failure that aroused great popular interest and led to a number of search expeditions. As a result many additions were made to the map of the Canadian Arctic, great advances were made in the technique of sledge travel, and attention was directed to the Smith Sound route as a possible base for an approach to the North Pole.

Before Sir John Franklin sailed, what has been called an 'unexplored quadrilateral' extended between Cape Walker, Banks Land, Wollaston Land and King William Land.[2] When the *Erebus* and *Terror* left Greenhithe on May 19th, 1845, with provisions for three years, the view was entertained by Sir John Barrow that a passage was possible, perhaps in one year, by following an opening out of Barrow Strait to the south and avoidance of coastal sailing—ice there would be on the polar sea, but not a complete cover. The Melville Sound route was not favoured because Parry had found heavy ice in the region

of Cape Dundas, barring his way in 1819 and 1820. Franklin's instructions directed him to consider Wellington Channel as an outlet from the archipelago if it should be open and Barrow Strait blocked—but his primary purpose was to make every effort 'to penetrate to the southward and westward' from 'the longitude of that portion of land on which Cape Walker is situated, or about 98° W.,' after entering Barrow Strait.

The two ships were seen by a whaler in Baffin Bay in July, 1845. An outline at least of subsequent events can be reconstructed from fragments of information collected by search expeditions, commencing with John Rae's contact with Eskimos in 1854, when surveying the west coast of the Boothia peninsula for the Hudson's Bay Company. He was told by an Eskimo that he had heard of white men moving south along the northern shore of King William Island, dragging a boat, after leaving their ships crushed in ice; there were grim references to dead men found near the mouth of the Great Fish river, and relics were produced which verified the story. Government search efforts ceased when this report reached London, Rae and his companions earning a reward of £10,000, for the first authentic news.

Lady Franklin was, however, still hopeful of survivors being found and the *Fox* sailed in 1857 under the command of Francis Leopold McClintock, who had developed a brilliant technique of Arctic sledge travel while employed with the first relief expedition, that of Sir James Ross in 1848, and further employed it when with the H. T. Austin expedition of 1850, and the expedition led by Sir Edward Belcher in 1852. McClintock leading a party from the *Fox*, fixed firmly in ice near the eastern entry to Bellot Strait, between Boothia and North Somerset Island, early in 1858 encountered Eskimos near Cape Victoria; they were in possession of relics from the Franklin ships. Later a party led by W. R. Hobson found the classic document of the Franklin tragedy while travelling along the west coast of King William Island. At Victory Point, the farthest west reached by James Clarke Ross in 1831, was a cairn, and enclosed in a metal case under the cairn, a form on which Lieutenant Gore had written, on May 28th, 1847, a message that included the phrase 'all well'; however, another

entry of April 25th, 1848, struck a different note and ended with the phrase 'start tomorrow, 26th for Back's Fish River.'

Apparently Franklin, after entering Wellington Channel and spending the winter of 1845–46 at Beechey Island, had followed Barrow Strait, Peel Sound, and Franklin Strait, until beset by ice in upper Victoria Strait on September 12th, 1846. In May 1847, Gore had led a small party probably to prove that Victoria joined Simpson Strait, thus linking the expedition route with a previously known district. With the death of Franklin on June 11th, 1847, Captain F. R. M. Crozier took command, and evidently in the following winter there was serious deterioration of health with the onset of scurvy. When the ships were deserted on April 25th, 1848, 9 officers and 15 men had died; the surviving 105 officers and men set out for a Hudson's Bay company post, aiming to go up the Great Fish river; graves, skeletons and relics marked the route, and Eskimos reaped a rich harvest. A north-west passage had been found, if not by Gore in 1847, by the doomed men of 1848, but this only came to be known some ten years later.

What were the causes of the Franklin tragedy? Vihjalmur Stefansson has examined the problem at length and sums up the main cause as cultural—'derived from the social and mental outlook of the period.'[3] In his view, when Crozier and his men abandoned their ships they 'were moving ashore with superior weapons, but with minds inhibited by the outlook of their time and service; with strength depleted by malnutrition.' These naval men could not maintain life in 'a district where several hundred Eskimos had been living for generations.' It is true that the veteran Franklin (he was 59 years old when he sailed) had travelled in the Canadian Arctic lands and eaten meat secured by hunting, but each of the expeditions of 1819–22 and 1825–27 ended in privation and hardship because of reliance on hired servants. If Franklin's men merely sought fowl it would not suffice; if they obtained meat it was presumably salted or over-cooked, since scurvy, with resultant weakness and lethargy, clearly overcame the crews. Fresh meat and fat, Stefansson points out, are effective anti-scorbutics—as effective as the more orthodox fruit and vegetables in fresh condition, and more effective than these latter after prolonged storage.

It was Robert J. McClure who first traversed the north-west passage, partly on foot. He had arrived in the *Investigator*, via Bering Strait, to search to the west of Melville Sound for Franklin, and sailed from the American mainland coast near Cape Parry into Prince of Wales Strait, between Banks and Victoria Islands, until checked by ice. When McClure realised that he was only 60 miles from Melville Sound he speculated on the significance of his position with pious humility:

'I cannot describe my anxious feelings. Can it be possible that this water communicates with Barrow's Strait, and shall prove to be the long-sought Northwest passage? Can it be that so humble a creature as I am will be permitted to perform what has baffled the talented and wise for hundreds of years? But all praise be ascribed to Him who hath conducted so far in safety. . . .'[4]

On October 27th, 1850, a sledge party contemplated from a hill at Cape Lord John Russell a view that included the south coast of Melville Island. A link with Parry's discoveries had thus been made, although not by ship. The winter of 1850–51 was spent in Prince William Strait and the two following winters on the north coast of Bank's Island. In April, 1853, McClure and his men were encountered by a party from Sir Edward Belcher's ships, the *Resolute* and the *Intrepid*, and returned home in them via Baffin Bay; the *Investigator*, long fast in ice, had perforce to be abandoned, since although release was hoped for, scurvy had begun to affect the crew. The contemporary view was expressed in Lady Franklin's words: McClure's transit 'though not the object which has engaged the attention of the civilised world for centuries, is a distinction of which any man might be proud.' He was rewarded with £5,000 and his officers and men with a like sum.

Thus when the great Norwegian polar explorer Roald Amundsen first sailed through the north-west passage it was a *tour de force* rather than a revelation of new geographical facts, that resulted—although Amundsen studied terrestrial magnetism in Germany as preparation for making a survey of the north magnetic pole. The *Gjöa*, a 47-ton yacht with a crew of seven, sailed in June, 1903, with provisions for five years, and entered the Pacific in the summer of 1906. Interestingly enough

Amundsen first became interested in polar exploration through reading the works of Sir John Franklin.

After Edward Parry in his expedition of 1827 failed to get further north than 82° 45′, by proceeding from Spitsbergen, even with his ingenious if laborious technique of hauling sledge-boats over ice, there was a lapse of many years before a succession of efforts was made to reach the North Pole; so far as the Smith Sound approach was used, the men concerned were mainly Americans, and the initial impetus was the outcome of an appeal made by Lady Franklin to President Zachary Taylor, for assistance in the search for her husband and his men.

Congress backed an expedition the two ships of which, the *Advance* and the *Rescue*, had been provided by Henry Grinnell of New York. The command was given to Henry J. de Haven; Navy Department orders were to reach Lancaster Sound, and in the event of a check by ice to follow Jones and Smith Sounds; the vessels left New York in 1850. Elisha Kane, a physician, who sailed with de Haven, was impressed with open water seen in Wellington Channel and after the return in 1851 started to raise funds for a second expedition, to penetrate to what, he was convinced, was an open polar sea. The English naval officer Edward Inglefield was also at this time optimistic, having glimpsed the extensive Kane basin to the north of Smith Sound, while engaged in the Franklin search.

There followed a series of expeditions; American, led by Kane (1853–55), Isaac Hayes (1860–61), Charles Hall (1870–73); and a British expedition led by George Nares (1875–77). The American Adolphus Greely expedition (1881–83) although it, too, was directed to the Smith Sound region, was not inspired by what the Austrian Karl Weyprecht had aptly called, in September 1875, 'a sort of international steeplechase towards the North Pole,' but was directed to the establishment of a base for meteorological and other observations as part of a network of such stations, the outcome of the organisation of an International Polar Year. On the other hand, for Peary, reaching the North Pole was a supreme objective, and he used the channels north of Smith Sound to approach by ship the base from which he finally made a successful dash in 1909.

George Nares led his expedition to the Arctic after being recalled from command of the *Challenger*, a ship carrying out important oceano-graphical survey work. The Smith Sound approach was decided upon after some years of acrimonious controversy had divided Arctic enthusiasts into two camps, those favouring the route adopted and those who had great hopes of the Spitsbergen area as giving a starting point more likely to be s uccessful. The *Alert* actually reached cape Sheridan on the coast of Grant Land, on the shore of the Arctic Ocean, before ice closed in. Sledge journeys were undertaken which showed that lessons learnt by earlier explorers could be forgotten, in that scurvy was rife; moreover the man haulage of sledges on which boats were mounted, often over rough ice, was not only extremely arduous but produced very slow progress; in one period of 26 days only 30 miles were covered and A. H. Markham's furthest north was 83° 20′. The attainment of the North Pole needed a Peary. The main outcome of the Nares expedition was a strong reaction against the theory of an open Polar sea.

It was to Cape Sheridan that the *Roosevelt* came on September 5th, 1908, bringing the American naval engineer Robert Peary and his party, which included Eskimos, his negro servant Matthew Henson, and a number of dogs. Peary had first visited the Arctic regions when he went to Greenland in 1886, and had spent many of the intervening years acquiring experience and a technique of polar travel; he twice crossed the ice cap of north Greenland, made a long journey to determine the northernmost promontory of land in Greenland, and reached 84° 17′ in 1902, 87° 06′ in 1906. For his final successful effort supplies were sledged from Cape Sheridan to the chosen base at Cape Columbia; this was about 100 miles further west along the north coast of Ellesmere Island, in about 83° N. and some 500 miles from the Pole, the nearest possible land base.

On February 28th, 1909, the sledge parties left Cape Columbia, and on April 2nd a party of six, Peary, Henson and four Eskimos, left the advance base in approximately 88° N., and covering about thirty miles a day over smooth ice, reached the Pole on April 6th. There were difficulties with open leads

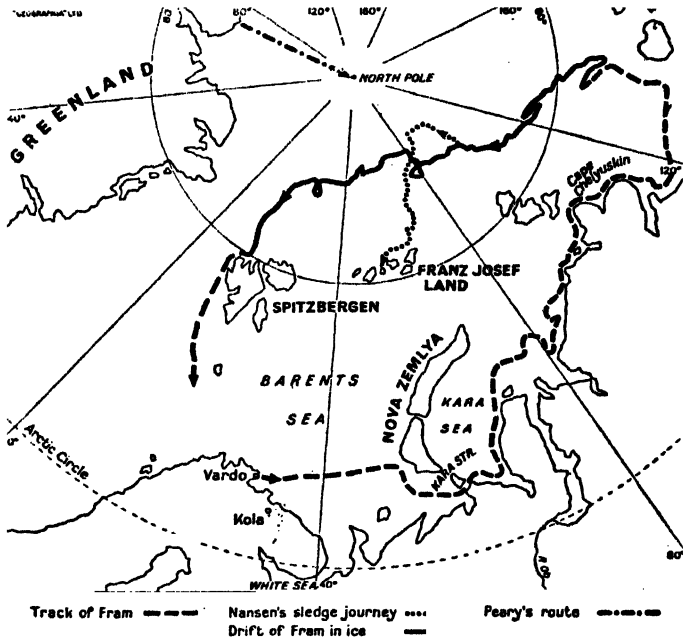

Fig. 9. The Arctic

of water, but winter travel minimised these. Peary hurried back in order to follow the outward trail with its snow houses, before weather and the drift of ice obliterated the route; Cape Columbia was reached on April 23rd. Andrew Croft argues that the 'efficiency of his leadership was the real key to his success' and that it was his courage and determination that made his polar journey seem easier than earlier attempts.

Of earlier attempts to reach the North Pole, other than those made by the Smith Sound approach, it is worth noting the Swedish made by A. E. Nordenskiöld in 1868 from Spitsbergen, the German, made by Karl Koldewey in 1869 from the same region, the Italian, made by Umberto Cagni in 1901 from Franz Josef Land, and above all the Norwegian expedition of Fridtjof Nansen. No greater contrast can be imagined than that between Peary and Nansen. The Norwegian realised that

attainment of the Pole was an immensely popular objective and called the book describing his expedition *Farthest North*, but in the introduction he writes,

'it is not to seek for the exact mathematical point that forms the northern extremity of the earth's axis that we set out, for to reach this point is intrinsically of small moment. Our object is to investigate the great unknown region that surrounds the Pole.'[5]

Nansen's technique was novel and daring. He was inspired by the fate of a ship called the *Jeannette*, which had sailed under the command of the American G. W. de Long, through Bering Strait, on the assumption that a warm current flowed along the coast of Wrangel 'Land'; he thought the latter perhaps extended across the Arctic region, and offered an approach to the Pole. Actually the ship was beset by ice in 71° 35′ N., 175° 6′ E., on September 6th, 1879, and drifted across the Arctic basin, to sink on June 12th, 1881 about 150 miles from the New Siberian Islands; only ten survivors reached a village on the river Lena.

Some three years later articles from the *Jeanette* were washed ashore in west Greenland, and Nansen, reading of this in the Norwegian *Morgenblad* of November 30th, 1884, decided that 'if a floe could drift across the unknown region, that drift might also be enlisted in the service of exploration.' There was the further evidence of driftwood of Siberian origin washed up on the east and west coasts of Greenland; the set of the drift was apparently to the west, and south between Greenland and Spitsbergen. Before putting his ideas into practice Nansen achieved no small task in crossing the Greenland ice cap, from Umivik fjord in about 65° N. to Godhaab on the west coast, in 1888.

Late in 1892 the *Fram* was completed: a ship of great strength designed to rise out of converging ice masses rather than to suffer crushing; a floating laboratory and base, equipped with provisions for five years. Commanded by Otto Sverdrup the *Fram* left Laurik in June 1893 and to the surprise of many sceptics returned safely in August 1896—when the scheme was proposed 'it met with opposition in the main, especially from abroad, while most of the polar travellers and

Arctic authorities declared, more or less openly, that it was sheer madness.' The *Fram* after rounding North Cape crossed the Barents Sea and the Kara Sea and more or less followed the Siberian coast to the region of the New Siberian Islands. Made fast to an icefloe in 78° 30′ N. the ship slowly drifted more or less westwards until in about 20° W. the drift was to the south, to north-western Spitsbergen; from there the *Fram* sailed home, her farthest north, 85° 55′, being reached on November 15th, 1895.

Meantime, on March 14th, 1895, Nansen and Hjalmar Johansen had left the ship to make a sledge journey as near to the North Pole as possible; the latitude of 86° 14′, was reached on April 7th and the explorers then made their way to land in the Franz Josef archipelago, by sledge and kayak. They were forced to spend a winter, living mainly on bear meat. Shortly after restarting, they had the good fortune to encounter Frederick Jackson, a British explorer leading the Harmsworth expedition to survey Franz Josef Land. It was in that expedition's relief ship that the Norwegians returned home.

Like Nansen, Vihjalmur Stefansson ranks high as an innovator. He has done much to build up a more favourable picture of the Arctic than the traditional one of a desert of eternal ice and snow. The work of the Canadian Arctic Expedition of 1913–18, which he led and on the course of which the pioneer polar flyer Sir Hubert Wilkins gained his first Arctic experience, was focused on part of the Canadian archipelago and the Beaufort Sea—significantly it is described in a work entitled *The Friendly Arctic*.

It has been aptly said that for this Canadian of Icelandic descent the Arctic 'is fruitful and friendly—comfortable and almost jolly.'[6] Trained as an anthropologist he spent the years 1908–12 with Eskimos in the Mackenzie delta region, and as a result built up a distinctive technique, the acquisition of mobility by the carrying of minimum rations, and 'living off the country,' Eskimo style. He points to forerunners, notably John Rae, but deplores the neglect of such methods by most later explorers. His unique contribution was not the notion of living on caribou and musk ox, bear and seal, but the carrying through with the Norwegians Storkerson and Andreasen, of a

96-day sledge journey on sea ice, from Point Martin in Alaska to Banks Island, in 1914, to show the possibility of securing seals, given favourable ice conditions, even away from the coast. Eskimo and whaler alike had been certain that this was suicidal.

Stefansson approves of the modern school of British explorers—they

'are showing themselves about the most adaptable travellers who have ever gone anywhere. They analyse and study the records of previous explorers, they watch the Eskimos, and they borrow from whatever source both ideas and things. They eat—and they love to eat—caribou and seal, whale, walrus and fish. They use every method, European or Eskimo, for securing them. They use dogs and snow-houses. They dress in Eskimo clothes. . . .'

He attributes all this to instruction and advice from 'Debenham, Priestley and Wordie, veterans of the Scott and Shackleton journeys,' but his own influence has been important.

Dr. Hugh Robert Mill wrote in 1905, in his classic work on Antarctic exploration,

'The siege of the South Pole has been a spasmodic operation, proceeding by magnificent efforts separated by long intervals of inertness and inattention. Half a century elapsed before Bellingshausen resumed the attack commenced by Cook, twenty years separated Bellingshausen from the period of D'Urville, Wilkes and Ross, and no less than fifty-four years passed before the task abandoned by the *Erebus* and *Terror* was taken up by the *Belgica* and the expeditions of the new century. . . .'[7]

The voyage of Bellingshausen led to the circumnavigation of the Antarctic, on behalf of Alexander I of Russia, in the years 1819–21; it was essentially a training voyage for Russian seamen. The commander, a great admirer of Cook, navigated his ships through no less than 42 degrees of longitude within the Arctic Circle, deliberately supplementing Cook's traverse rather than duplicating it. In Debenham's view he was the first to discover the 'main Antarctic continent,' on February 5th, 1820; it was three weeks after Edward Bransfield had seen

Trinity Land, but this was the northern extremity of the long Graham Land peninsula. Bellingshausen was 'distant about 50 miles from what was plotted by the Thorshammer in 1931 as Princess Ragnhild Land. . . .'[8]

Referring to the unfortunate Anglo-American controversy that has arisen over the claim to first discovery of Graham Land, Nathaniel Palmer and Edward Bransfield being the American and British nominees respectively, Debenham deplores the fact that 'the undoubted fine work of these men, Bransfield, Palmer, and Bellingshausen . . . has been distorted or disparaged in order to press the question of priorities and the extent of map to be covered by a name.'

The Antarctic expeditions of Dumont D'Urville (1837–40) Charles Wilkes (1838–40), and James Clarke Ross (1840–43) were French, American, and British expressions of a revival of interest in the extension of scientific knowledge—not unconnected with interest aroused in the results of earlier voyages by sealers; James Weddell had found extraordinarily ice-free conditions in the sea named after him, reaching 74° 15′ S. in 1823, and Biscoe and Kemp in the employ of Enderby Brothers, owners of whaling and sealing vessels, had sighted land, in 1831–32 and 1834 respectively.

The study of magnetism had for some time attracted much attention; Alexander von Humboldt, a man with great influence, was himself interested and active in its pursuit. James C. Ross had in fact visited the north magnetic pole in 1831. The German physicist Johann Gauss, had calculated that the southern counterpart was in approximately 66° S. 146° E., and the notion that a ship might sail to it became very attractive.

D'Urville sailed unenthusiastically to uphold the prestige of France, and was happier when following his own ethnological interests in the Pacific for two years than when he sought to follow Weddell, in January 1838, and found his way barred by ice as far north as 63° 39′ S. It was not until January 1840 that in a competitive spirit the Frenchman sailed south from Tasmania, to find what he named Adélie Land barring his route to the south magnetic pole. D'Urville actually encountered one of Wilkes' four ships.

The American squadron was dogged by every kind of misfortune; unwilling crews manned unsuitable ships and the land reached by Wilkes was that with which D'Urville was in contact at about the same time. The American was 'too ready to report land without proving its existence,' and later explorers have sailed over what he charted as land, on more than one occasion.

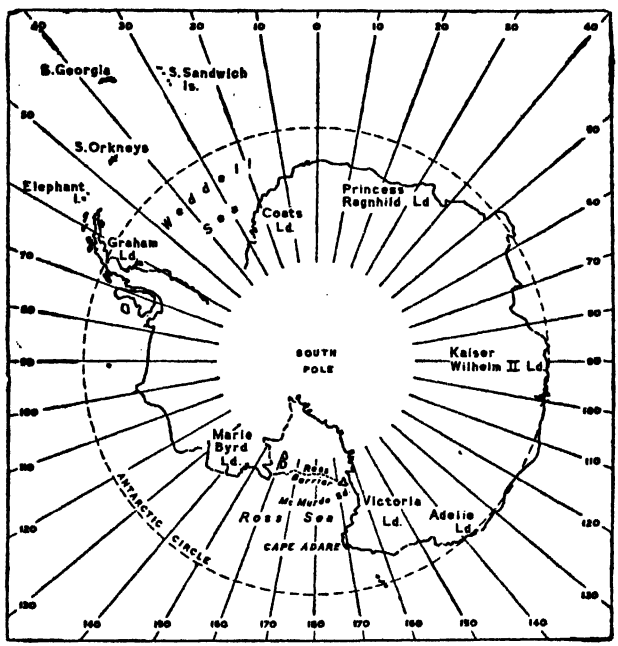

Fig. 10. The Antarctic

The Ross expedition was the happiest of the three. It had its origins in proposals put forward by the British Association for the Advancement of Science (which had been founded in 1831) and supported by the Royal Society. J. C. Ross was clearly a well qualified commander; he sailed in the *Erebus* (370 tons) while F. R. M. Crozier commanded the sister-ship, the *Terror* (340 tons). The expedition 'was purely naval, the scientific equipment was utterly inadequate and no scientific

staff was carried' although an assistant surgeon was later to become the celebrated scientist Joseph Hooker.

When the ships arrived in Hobart in August 1840 it was to hear of the work of Wilkes and D'Urville. Ross was angry and determined 'not to follow in the footsteps of the expedition of any other nation.' It was a fortunate decision in that the more easterly meridian he chose to follow, 170° E., led to a zone where the sealer *Balleny* had found open sea in 69° S. in 1839. Ross emerged in open sea after passing through pack ice, and in January 1841 Cape Adare was sighted; land prevented sailing to the magnetic pole, but it was land of scenic splendour and eventually 78° 4′ S. was reached. Mountain ranges in Victoria Land rose to peaks 14,000 ft. in height and these were named after notables at home: the active volcano of Mt. Erebus was seen, and the lofty ice cliffs of the flat topped Ross Barrier were followed as far as 167° W. The ships returned to Tasmania to winter; their later activities involved much danger and yielded meagre results, but a safe return was made to England in September 1843.

In the period between the highly successful voyage of Ross and the sailing of the *Belgica* in 1897 no major enterprise was launched. The *Erebus* and the *Terror,* fitted with auxiliary engines, faced the north polar ice on the Franklin expedition, and this, with subsequent searching for survivors, occupied public interest for a long time. Enthusiasts for the south there were, like the American naval officer Matthew Maury, oceanographer and climatologist, and his follower in Germany, Dr. Georg von Neumayer. Later, Sir John Murray became a powerful advocate; he was a member of the *Challenger* expedition, which made important oceanographical investigations in Antarctic waters in 1873–74, and found not only abundance of marine life but evidence of continental rocks to the south.

Sealers and whalers later began to turn to the Antarctic for new fields of exploitation and gave opportunities to enterprising scientists to sail far south—W. S. Bruce sailed thus from Dundee in 1892. The Sixth International Geographical Congress held in London in 1895 passed a resolution which marks the formal beginning of a new period of effort: 'The Congress records its opinion that the exploration of the

Antarctic regions is the greatest piece of geographical exploration still to be undertaken . . . the Congress recommends that the scientific societies throughout the world should urge . . . that this work should be undertaken before the close of the century.' In fact, of course, the larger expeditions waited upon lengthy deliberations and negotiations and were not launched until early in the new century, but Gerlache and Borchgrevink were earlier in the field.

Adrien de Gerlache led a Belgian enterprise, although several nationalities were represented in the company on the *Belgica*—including Roald Amundsen as mate. Leaving Antwerp in 1897 he went to the west of Graham Land and unexpectedly and unpreparedly spent a winter described by a member of the company as 'hellish.' Carstens Borchgrevink, a Norwegian, financed by Sir George Newnes, took the *Southern Cross* on a British venture to the Ross Sea region in 1898—a party wintered at Cape Adare.

More ambitious expeditions followed, three being national: the British led by Commander Robert Falcon Scott, R.N., in the *Discovery* (1901–04), the German led by Professor Erich Drygalski in the *Gauss* (1901–03) and the Swedish led by Otto Nordenskjöld in the *Antarctic* (1901–03). W. S. Bruce in the *Scotia* (1902–04) led a Scottish expedition. In the months of February and March 1903 all four expeditions were south of 60° S. and in the summer of that year Jean Charcot in the *Français* (1903–05) commenced work. The British and German expeditions had planned a measure of co-operation in meteorological and magnetic observations; the former went to the Ross Sea region, the latter discovered Kaiser Wilhelm II Land. Nordenskjöld and Bruce visited the Weddell Sea region, Bruce discovering Coats Land, named after his financial backers; Charcot went to the west of Graham Land.

When H. R. Mill wrote his book, the siege of the South Pole had been raised and he deplored the lack of continuity that had long been a characteristic of polar exploration—stores had been sold, ships disposed of, the public had lost interest, explorers had gone back to their old occupations, learned societies had folded their hands. Within a few years, however, men of energy and determination had succeeded in raising

funds, capturing public interest, and preparing expeditionary parties once more. Charcot in his *Pourquoi Pas?* went back to the scenes of his earlier labours in 1908–10. Ernest Shackleton led the *Nimrod* expedition of 1907–09, Roald Amundsen the *Fram* expedition of 1910–12 and R. F. Scott the *Terra Nova* expedition of 1910–13. The South Pole was reached by Amundsen on December 14th, 1911, by Scott on January 17th, 1912.

Amundsen seized what most regarded as the greatest prize of Antarctic discovery in somewhat curious circumstances. Nansen's old ship, the *Fram*, left Norway in August 1910 on what was announced as a drift across the Arctic and a journey to the North Pole from the ship as a base. However, at a late stage in preparation the leader had changed his mind, on hearing of Peary's success, but not until Madeira was reached did he announce his changed objective, in a telegram to Scott, already in Australia. 'The British expedition,' he wrote later, 'was designed entirely for scientific research. The Pole was only a side issue.'[9]. On his expedition the converse was true. He reached his objective with smooth efficiency.

Amundsen chose as a base a site on the Ross Barrier, at the Bay of Whales; amongst other advantages, 'we could there go farther south in the ship than at any other point—a whole degree farther south than Scott could hope to get in McMurdo Sound, where he was to have his station.' Shackleton had noticed the possibility at an earlier date but thought the locality to be dangerous—Amundsen was convinced that the shelf ice, generally afloat, was in fact here attached to terra firma. There was the further advantage that the abundance of seal and penguin promised the opportunity to accumulate a large store of food and secure the fresh meat that Amundsen was convinced was essential to ward off scurvy—food for men and dogs. Dogs played a vital part in Amundsen's success on the journey to the Pole; they were particularly valuable on the Axel Heiberg glacier surface that led from the barrier through a gap in the Queen Maud mountains to the lofty plateau beyond; dogs were food for dogs and men, when need arose for fresh meat.

The Norwegian explorer and his four companions, all

expert with skis, left his base, Framheim, on October 19th, 1911, and followed a route almost due south; food depots had been laid at intervals, over part of the route, the previous autumn, and the trail was marked by snow beacons and further depots laid at intervals on this journey. The distance of about 870 miles was covered by December 14th, and in brilliant sunny weather, with a light wind, the Norwegian flag was raised on what was named King Haakon VII's Plateau. The outward average daily traverse of 15½ miles a day was exceeded on the return, when the mileage was 22½. There was plenty of food, always a reserve of energy, and the weather was favourable—the recorded temperature range on the polar journey was −24° F. to +23° F. Framheim was regained on January 25th and Amundsen later added to his polar trophies by sailing through the north-east passage in the *Maud*, in the years 1918–20, and by flying over the North Pole from Spitsbergen to Point Barrow together with the American airman Lincoln Ellsworth, in the Italian airship *Norge* in 1926. He met his death when flying north to the scene of Italian airship disaster in May 1928.

Captain R. F. Scott arrived in the Ross Sea in the *Terra Nova* in January 1911 and established a base at Cape Evans, McMurdo Sound. He had, in the summer of 1902, sledged with E. H. Shackleton and E. A. Wilson over the Barrier to 82° 17′ S. Shackleton, with J. Adams, E. Marshall and F. Wild, had made an epic journey in the summer of 1908–09 to within 111 miles of the South Pole, traversing the Barrier, ascending the Beardmore Glacier on to the plateau at about 9,000 ft. above sea level. Scott aimed now at following this route and completing the journey.

He set out on November 1st (the late start was due to loss of pony transport) and after 78 days' travel over some 900 miles, reached the objective, together with Dr. E. A. Wilson, Lt. Henry Bowers, Captain L. E. G. Oates and P.O. Edgar Evans. 'Now for the run home and a desperate struggle. I wonder if we can do it,'[10] he wrote in his diary. The strain had already been great, and the disappointment at finding evidence of Amundsen's previous visit most acute. The return, and the manner in which death was met by Evans first, then Oates,

and finally by the three survivors in their blizzard-bound tent, is a well-known epic of polar exploration. Scott's last entry in his diary was written on March 29th, thirteen miles from One Ton Depot (which was 132 miles from the winter base), when the weather, steadily becoming more and more adverse, had become impossible. Exhaustion from sledge hauling, onset of scurvy, frostbite, lack of food and fuel, sheer bad luck, all were met with dogged determination by the polar party of Scott's Last Expedition.

It must not be thought that the Ross Sea expeditions of Scott and Shackleton were solely directed to the attainment of the South Pole. Scott with two companions made a 300 mile journey to the ice-covered plateau of Victoria Land in 1903. The director of the scientific staff of the *Nimrod* expedition, Professor Edgeworth David, with Douglas Mawson, physicist, and A. F. Mackay, reached the South Magnetic Pole on January 16th, 1909. Among the scientists on Scott's last expedition were the geologists, Frank Debenham (first director, in 1934, of the Scott Polar Research Institute at Cambridge), T. Griffith Taylor and Raymond Priestley; G. S. Simpson went as meteorologist—all found opportunities of doing valuable work. On Scott's first expedition there were two zoologists, a biologist, a physicist and a geologist.

Of later expeditions it is possible here to mention only the more outstanding. Several have been British. Douglas Mawson led an Australian expedition to extend knowledge of the little-known border of the Antarctic continent between Cape Adare and Kaiser Wilhelm II Land; three bases were established, including one at Macquarie Island; the party at Cape Denison in 1912 experienced the almost continuous blizzard that is characteristic of much of the edge of the continental ice cap. Sir Douglas Mawson in the summers of 1929–30 and 1930–31 charted a great length of Antarctic coastline, cruising in the *Discovery*; this vessel had been engaged, like the Norwegian *Norvegia*, in research on oceanography, especially in relation to all-important whaling problems, until she was superseded by the specially constructed *Discovery II* in 1927.

Sir Ernest Shackleton, sailing south in the *Endurance* in 1914 with J. M. Wordie as chief scientist, had planned a

crossing of Antarctica from the southern shore of the Weddell Sea, to Ross Sea; but his ship was gripped by ice, early in 1915, and subsequently crushed. His later exploit, sailing some 800 miles in a ship's lifeboat, with five companions, from Elephant Island to South Georgia, to secure rescue of all his men, is an epic of polar fortitude. It was fitting that such an explorer as Shackleton should find a grave in South Georgia, dying while on his way south in the *Quest*, in 1921—Frank Wild carried through the projected work. J. R. Rymill led the small-scale but effective British Graham Land Expedition of 1934–37 and during the recent war, prosaic but important and systematic survey work, and scientific investigation, were set on foot in the Falkland Islands Dependencies.

The leader who has directed public interest to Antarctica most successfully, through the medium of wireless, newspaper and magazine in recent decades, has been the American explorer, Richard E. Byrd. He was first active in the Arctic, flying from Spitsbergen to the North Pole and back with Floyd Bennett, in May 1926.

Two expeditions to the Ross Sea region, in 1928–30 and 1933–35, achieved important results—the U.S. Antarctic Service Expedition of 1939 was forced to cut short its activities early in 1941. Byrd chose as his base Little America, on the Bay of Whales. His flight over the South Pole in November 1929 he rates as one of the less important achievements of the first expedition, which, like the second, had important scientific objectives—in fact, he wrote, in his account of the latter, 'I believe that we all pride ourselves on having achieved, by a fair margin, the most complete program of scientific research in the history of polar exploration.'[11] Byrd's work has been mainly in Marie Byrd Land, to the east of the Ross Barrier; his equipment has included old and new elements—'planes and tractors are superb instruments, but there is no getting away from dogs. The Eskimo husky still is, as he has always been, the one absolutely reliable means of polar advance.' Rear-Admiral Byrd, in relation to his second great expedition, makes a statement of policy of wide application to work in all continents:

'Geographical discovery is still, as it always was, the brightest weapon in the explorer's armory; but in the new philosophy of exploration it is principally a tool for getting at something deeper. It attains the dignity of a science only when rising above the superficial glory of a first penetration, it brings the apparatus of science to bear upon the *unknown* for the truer understanding of a multiplicity of problems.'

[1] A Croft, *Polar Exploration*, 2nd edition, 1947.
[2] See R. J. Cyriax and J. M. Wordie, 'Centenary of the Sailing of Sir John Franklin with the Erebus and Terror,' *Geographical Journal*, Volume CVI.
[3] See V. Stefansson, *Unsolved Mysteries of the Arctic*, 1939.
[4] Quoted by N. M. Crouse, *The Search for the Northwest Passage*, 1934.
[5] F. Nansen, *Farthest North*, 1898. For an account of this and other expeditions directed to the North Pole, see N. M. Crouse, *The Search for the North Pole*, 1947.
[6] V. Stefansson, *The Friendly Arctic*, 1921. Foreword by Gilbert Grosvenor.
[7] H. R. Mill, *The Siege of the South Pole*, 1905.
[8] *The Voyage of Captain Bellingshausen*, 1819-21, edited by Frank Debenham, Hakluyt Society, 1945.
[9] R. Amundsen, *The South Pole*, 1912.
[10] See *Scott's Last Expedition* for the journal, edited by L. Huxley, 1913.
[11] R. E. Byrd, *Discovery*, 1935.

12

THE SCIENTIFIC TRAVELLER HUMBOLDT

The part played by scientists in recent and contemporary exploration is evident enough. The greatest of earlier scientific travellers was Alexander von Humboldt (1769–1859), and it is fitting to conclude this book with some reference to his place in the history of geography. Not the first in his field of work, he was, none the less, the greatest forerunner of the modern school, and his was the unique distinction of giving a great impetus to the study of geography as it is pursued today.

The astronomer Edmund Halley (1656–1742), who has

been called by Sir Napier Shaw 'the father of dynamical meteorology,' achieved the distinction of commanding a warship, in the year 1700, on an expedition which had as its objective the study of magnetic declination in the Atlantic Ocean, while of his contemporary, William Dampier, Sir Albert Gray has said that 'with a sounder scientific education his status on a world cruise might have been that of Darwin on the *Beagle*' (1831–36). However, it was in the latter eighteenth century that both in France and England the importance of scientific enquiry was more fully recognised—Bougainville took de Commerçon, Cook on his first voyage Sir Joseph Banks, and on his second the Forsters, father and son. The Forsters wrote an account of the voyage and published it in London in 1778, under the significant title of *Observations Made During A Voyage Round The World, on Physical Geography, Natural History, and Ethic Philosophy.* The son, George Forster (1754–94) had important influence on the career of Humboldt—who wrote in his *Cosmos*:

'If I might have recourse to my own experience, and say what awakened in me the first beginnings of an inextinguishable longing to visit the tropics, I should name George Forster's descriptions of the islands of the Pacific—paintings by Hodge, in the house of Warren Hastings, in London, representing the banks of the Ganges—and a colossal dragon tree in an old tower of the Botanic Garden at Berlin.'

Further on the subject of the furtherance of 'the scientific study of nature,'

'The writer who, in our German literature, has, according to my feelings, opened the path in this direction with the greatest degree of vigour and success, was my distinguished teacher and friend George Forster. Through him has been commenced a new era of scientific travelling, having for its object the comparative knowledge of nations and of nature in different parts of the earth's surface. Gifted with refined aesthetic feeling, and retaining the fresh and lively pictures with which Tahiti and the other fortunate islands of the Pacific had filled his imagination (as in later years that of Charles Darwin), George Forster was the first gracefully and pleasingly to depict the different gradations of vegetation, the relations of climate, and the various articles of food, in their bearing on the habits and manners of different tribes according to

their differences of race and of previous habitation. All that can give truth, individuality, and graphic distinctness to the representation of an exotic nature is united in his writings. . . .'

Humboldt was a wealthy man who devoted a long life to the pursuit of knowledge, working in Paris and Berlin, and he published a large number of scientific works. In the preface to his *Cosmos*, a work which set out to be 'a sketch of a physical description of the universe,' he sets out his philosophy in brief:

'While the outward circumstances of my life, and an irresistible impulse to the acquisition of different kinds of knowledge, led me to occupy myself for many years, apparently exclusively, with separate branches of science,—descriptive botany, geology, chemistry, geographical determinations, and terrestrial magnetism, tending to render useful the extensive journeys in which I engaged, —I had still throughout a higher aim in view; I ever desired to discern physical phenomena in their widest mutual connection, and to comprehend Nature as a whole, animated and moved by inward forces. . . . The separate branches of natural knowledge have a real and intimate connection. . . .'

He was further an inland traveller:

'I have enjoyed one advantage which few scientific travellers have shared to an equal degree, in having seen not merely coasts, and districts little removed from the margin of the ocean, as in voyages of circumnavigation,—but in having, moreover, traversed both in the new and the old world, extensive continental districts, presenting the most striking contrasts; on the one hand, the tropical and alpine landscapes of Mexico and South America, and on the other the dreary uniformity of the steppes of northern Asia.'

Humboldt's most important work was carried out in South America, in the region of the Orinoco, of the Magdalena, and the northern Andes (1799–1803); in Mexico (1803–04); and in Asiatic Russia (1829). One of the most interesting of his works geographically is his *Essai politique sur la royaume de la Nouvelle Espagne*, published in 1808, and translated into Eng-

lish. It was dedicated to Charles IV, 'King of Spain and the Indies,' and is a work of a particular value to the historical geographer. Humboldt considers extent and physical aspects, climate, agriculture, commerce, defence of coasts, population (with reference to numbers, and racial and social lines of cleavage), mines, manufactures, revenues and the problem of communications between the Atlantic and the Pacific. His work was based on his own travels, on diligent enquiry, and on available literature. Of the fifty known positions for the interior he himself established thirty-three. He knows that his physical map is imperfect, but he traced 'the direction of the Cordilleras, not from vague suppositions or hypothetical considerations but from a great variety of data furnished by persons who had visited the Mexican mines.' His scientific spirit is seen, too, in his remarks on the necessity of checking 'fictions of kingdoms, towns, and villages' by travel.

The striking aspect of Humboldt's work is its wide scope. He has been described as 'the last man who could grasp the whole of the rapidly widening sheaf of natural science.' Even so, his *Cosmos* appeared over a wide span of years—a volume in each of the years 1845, 1847, 1850 and 1858, and one after his death, in 1862—with the result that they failed to keep abreast of new developments in all branches of knowledge.

We must look for the successors of Humboldt among men less versatile but of great attainment—such explorers as the geologist Baron von Richthofen, who worked in China in the years 1868–72; the naturalist A. R. Wallace, associated with the East Indies in the period 1854–60; Sven Hedin, archaeologist in central Asia, who made three important journeys in the period 1895–1908; and Sir Aurel Stein, also archaeologist, who made three journeys in Chinese Turkestan and adjacent areas in 1900–01, 1906–08 and 1913–16. Stein, who worked for the Indian Archaeological Survey, the British Museum and the Royal Geographical Society, travelled 25,000 miles on horse and foot, and wrote a succinct account of his labours in his book, *On Central Asian Tracks* (1933); this is an excellent introduction to the work of the modern scientific traveller in Asia; to comparable narratives in the field of African and polar exploration we have already referred.

APPENDIX

THE HISTORY OF NAVIGATION

BY E. M. CAMPBELL

The Arte of Navigation demonstrateth how by the shortest good way, by the aptest direction and in the shortest time a sufficient ship . . . be conducted.[1]

Navigation is the science of determining the course of a ship from one point to another out of sight of land. It was early distinguished from pilotage (the art of setting the correct course when working up a buoyed channel or along a coast) and was sometimes styled in modern times artificial or great, while pilotage was known as common or short navigation.[2] But whether a ship's course was set in coastal waters or on the high seas, the fundamental task was the same, fixing a position and laying off a course. Out of sight of land, it became more difficult for there were neither landmarks nor a visible path to guide the navigator. His only guides were the sun, the moon and the stars. Even these might fail him when the sky was overcast. For many centuries shipmasters nosed their ships into harbour, feeling their way in shallow water with the aid of a sounding lead and determining their path by reference to landmarks. Out of sight of land, they had to depend on their knowledge of winds and the sky to guide them. This method of navigation without instruments came to be termed improper navigation. Proper navigation was navigation by chart and compass.[3]

Who first conducted a sufficient ship out of sight of land is not known. The island-studded Aegean Sea has long been recognised as an ideal nursery for sailors, and the first great sea-power arose in Crete. At an early date trade was established between Crete and Egypt. The Minoan ships awaited

the steady Etesian winds, which, blowing from the north-west, helped them to reach the Egyptian coast. The return voyage was made along the Lebanon coast. The Egyptians also made use of the alternating monsoons in the Red Sea. Their ships carried sail, but since they could run only before a following wind, were equipped also with banks of oars and rowers between decks.[4]

It seems probable that the early navigator did not leave harbour until he was assured of a following wind; this is suggested by certain statements surviving in early geographical texts. Their phrasing suggests that they were copied from books of sailing directions. *From Paphos* 3,800 *stades with Boreas to Alexandria*, for example, suggests that the voyage was made when Boreas, the cold north wind was blowing. Determining direction by winds was a fairly reliable method because these could be recognised by their feel and quality. The seaman thus had a rough idea of the direction in which he was sailing, even when he was out of sight of land.

The distances given were less reliable because they were determined in the first place from the time taken to complete a voyage. This varied with the going. The early navigator does not appear to have had any form of log line. Thus the ship master was forced 'to beat up and down the coast' until he recognised some familiar landmark. This was a practice which continued for many centuries, indeed into modern times, in fact until longitude and latitude could each be determined precisely.

Early sailing directions were also given in terms of astronomical events, e.g. *From Delos* 50 *miles towards the summer sunrise to Ikaria* (*Icaros*). Such a statement did not mean that the voyage was made only at the time of the event named. The ship master would be able to interpret the directions in terms of a wind-bearing system. The earliest complete wind-bearing system extant is that generally ascribed to Timosthenes. His wind rose had only twelve points so that each wind possessed thirty degrees of the horizon.[5] A third early method of defining direction was in terms of hours, e.g. *From Pluviolia . . . in the direction of the ninth hour to the Fortunate Isles.* This likewise assumes the possession of a wind rose; the 12 point rose

of Timosthenes was easily related to the 24 hours of the day as well as to the 360 degrees of the circle.

It is impossible to say to what extent astronomical methods were used by early mariners to determine direction at sea. Shipmasters would have been familiar with the method of finding north and south from the south-north line drawn by the noon-tide shadow. From this they also determined east and west. We know also that the Phoenicians used the Pole Star and the Lesser Bear to guide them. It is also recorded that the famous Greek astronomer, Pytheas, sailed on a Phoenician ship to Britain. It was Pytheas who some time about 326 B.C. ascertained with an amazing degree of accuracy the latitude of Marseilles, where he was living. He used a gnomon. That erected by Pytheas was a tall one and by measuring its shadow along a horizontal surface, he found the distance from the equator. The length of the shadow varied with the distance from the equator. But it is most unlikely that Pytheas instructed the master of the ship on which he sailed to Britain in the use of the gnomon. The tossing deck would not have been a suitable surface.

Even in the second century A.D. the navigator still seems to have found his way across the sea without the aid of instruments for determining his position. He may, however, have had a chart, for we know that some time about 150 A.D. Claudius Ptolemy revised the charts of Marinus of Tyre.[6]

Although progress in navigation during those centuries which tradition has styled the Dark Ages, has gone unrecorded, it was some time during this period that improper navigation was replaced on the high seas by proper navigation. During these centuries, probably in the ninth century, the chart and the compass came into use. The earliest literary record of their use by seamen is in a late thirteenth-century text.[7] The earliest chart surviving is but a crude sketch bound up in an eleventh-century manuscript.[8] But the chart from which this rough sketch was copied was one of the many used in the compilation of the highly refined portulan charts, characterised by the very careful manner in which the coastline is delineated and offshore rocks marked, although soundings are not given. Another portulan feature is the elaborate network of criss-crossing lines

or rhumbs. This network consisted of several sets or systems of thirty-two lines radiating from a number of points. In theory with the aid of dividers and a parallel rule, the navigator could find from his chart the distance and bearing between any two points. In practice this could not be done for some centuries yet to come; the parallel rule was not invented by Mordente until 1584. Moreover, latitude could not yet be measured to nearer than half a degree and there was no method of determining longitude.

By the end of the thirteenth century the navigator had a chart and compass and also navigated by the Pole Star or the *Stella Maris*. The earliest compasses are believed to have consisted of slabs of lodestone balanced on wooden floats in bowls of water. But by the twelfth century, this simple type had been replaced by a needle thrust through a piece of wood to form a cross, the wood floated on the surface of a bowl of water. Within a century the pivoted type of dry compass in which the needle was balanced on a pin-point had been devised, although the card does not appear to have been added until the lapse of another fifty years. The master Mariner had not yet faced the problem of magnetic variation although the compass makers themselves were aware of it. They concealed it by placing the *fly* on the needle so that it appeared to read correctly.

Within the limits of the Mediterranean, this method of adjustment was fairly adequate, and it was not until the Portuguese and Spaniards sailed into the Atlantic that the problem of the variation of the compass became a real one and the more able pilots began to demand a special type of compass, the azimuth compass as it was later known, by which they could check the variation each noon.

Although the thirteenth-century mariner navigated by the Pole Star, he was not able to 'shoot it,' i.e. measure its altitude, and so determine his latitudinal position. The fore-staff, cross-staff, *balestilha*, or Jacob's Staff as it was variously known, was not invented until 1342. Moreover, it did not pass into common use among seamen until early in the sixteenth century. At first it consisted of only two pieces, a long flat stave with a short crosspiece which slid smoothly to and fro. The observer aligned one edge of the crosspiece on the horizon, the other on the Pole

Star, probably with the aid of sighting pins or slits. The main stave was graduated so that from the position of the crosspiece (cursor or transom) the observer could read off the altitude of the Pole Star and thus determine the latitude. In practice it was not sufficient just to read off the altitude since the Pole Star was not coincident with the Pole of the heavens. In the fourteenth century the star described a circumpolar circle of about 7 degrees diameter and so it was necessary to add up to $3\frac{1}{2}$ degrees to (or to subtract $3\frac{1}{2}$ degrees from) the observations according to the time at which the observation was made in order to obtain the actual latitude. But the pilot was not expected to know the theory behind this operation. He made the necessary correction following a rule, the *Regiment of the North Star*, which was set down in his manual. He determined the time at which he made the observation by reference to the Lesser Bear which was his nocturnal clock; its hour hand was the 'Brightest of the Guards.' According to its position the navigator found from the table the number of degrees to add to, or to subtract from, his observed altitude of the Pole Star.

Several centuries later, an instrument was invented by which the hour of the night could be found—the *nocturnal* which was first made about 1520, but which did not come into general use until the seventeenth century. The nocturnal consisted of two concentric circular plates; an outer, about three inches in diameter, was divided into twelve equal parts corresponding to the twelve months, each part being subdivided into groups of five days, and an inner circle which was graduated into twenty-four equal parts, corresponding to the hours of the day, each further subdivided into quarters. The handle was fixed to the outer circle in such a way that the middle of it corresponded with the day of the month on which the guards had the same right ascension as the sun (crossed the Meridian at noon). From the common centre of the two circles extended a long index bar, which, together with the inner circle, turned freely about this centre which was pierced with a round hole. To make a reading, the navigator turned the projection at twelve hours on the inner plate until it coincided with the day of the month; he held the instrument with its plane parallel to the equinoctial. The observer looked at the Pole Star, through

the hole in the centre and turned the central index bar until the *guards* were seen just touching its edge. The hour figure in line with this edge was read off from the inner plate and it was roughly the hour of the night.

The finding of latitude by reference to the North Star proved adequate until the Portuguese exploration of the African coast. Even before a ship crossed the equator the Pole Star was too low on the horizon for its altitude to be taken with the *balestilha*, and the Lesser Bear was partly dipped below the horizon. The astronomers of the day realised that it was necessary to find another method of determining latitude in the southern hemisphere. The only practicable solution was to observe the height of the sun at noon. Martin Behaim, a learned German astronomer at the Portuguese Court, modified the astronomer's astrolabe for the use of seamen.

The simplified instrument consisted of a solid graduated circle, in the centre of which a sight rule was pivoted; a thumb-ring was attached and the instrument was made as heavy as possible to offset the movement of the ship.[9] Calculating latitude from the observed altitude of the sun was difficult as it involved calculating the solar declination (the angular distance north or south of the celestial equator). Again the astronomer aided the seaman by framing a new rule, the 'Regiment of the Sun,' and preparing tables of declination which were added to seamen's manuals together with worked examples; these covered cases of northern and southern declination respectively and also took into account the position of the ship relative to the sun (i.e. whether it was poleward or equatorward of the sun). Having taken his observation, a navigator had only to look up the required tables and follow the steps in the new rule.

Determination of latitudes was of first importance because the general practice when sailing out of sight of land was to seek the approximate latitude of the port required and to try to hold to that latitude until the coast was reached. The instruments in use were crude, even as late as the end of the sixteenth century, and did not allow a reading to be made to more than half a degree, so that the practice of 'beating up and down' the coast looking for landmarks continued and the pilot books of the day included sketches of coastal features. If a ship was

'blown off' course, the master tried to recover latitude but this could not be done except in clear weather. The problem of determining latitude 'without sun or star' occupied the minds of practising mathematicians throughout the seventeenth century.

The astrolabe and cross staff were not superseded until 1731. In that year the Englishman, John Hadley, invented the first modern sextant. Termed an octant by its inventor, it overcame a fundamental difficulty in taking astronomical readings on board, that of the motion of the sea. Hadley's instrument embodied Newton's idea of bringing the reflection of one object to coincide with the direct image of the other. The sextant is essentially a modern instrument and is fully described in manuals of both surveying and navigation; in current navigational manuals the steps which must be taken by anyone wishing to determine latitude with it are clearly set down.

How to determine longitude at sea by a simple and foolproof method was a problem which worried mathematician and navigator alike for many centuries. Theoretically the problem of determining longitude had been solved by the end of the fifteenth century by the method subsequently known as lunars. It is described in an *Ephemerides astronomicæ* published at Nurnberg in 1474. It involved measuring the distance between the moon and a star; but it was of no practical use to seamen owing to the imperfect knowledge of the true positions of the moon and stars; the heliocentric theory of Copernicus was not given to the world until 1543—*De Revolutionibus Orbium Coelestium* being published in that year. Moreover, the instruments of the day were not sufficiently refined to measure the distances with the necessary degree of accuracy.

In *Les Principes d'Astronomie et Cosmographie avec l'Usage du Globe* (1508 edition), Gemma Frisius advocated the determining of longitude by this method and described how longitude could be found by noting eclipses of the moon and conjunctions (the apparent proximity of two heavenly bodies). He advocated using the meridian of the Fortunate Islands as the standard meridian, although in the 1530 edition of the same work he showed that a simpler method was to note simultaneously the difference between the local time of two

places. This is in fact the method employed to-day. He proposed that this should be done by the use of clocks, but those of the day were too inaccurate for the method to be of practical use and its application had to await the making of an adequate chronometer, one whose rate of movement would not be affected by changes of temperature or by a ship's motion.

Not until 1735 was a reliable clock made by John Harrison; his clock, which eventually secured for him an award of £20,000 from the Board of Longitude, which had been set up in the reign of Queen Anne, embodied the principle of compensation through the unequal contraction of two metals. Moreover, he devised a means by which the chronometer retained its motion while being wound up. For many years the method of lunars was still employed as a check on the accuracy of chronometers; indeed, the tables for computing longitude by lunars were dropped from the Nautical Almanac only when wireless time signals could be transmitted across the world. Maskelyne, Astronomer Royal, set forth clearly in 1766 the observations necessary for finding longitude at sea:

> There are 4 observations necessary to be made. . . . The first is an altitude of the sun or some bright star, for regulating a watch, by which the other observations are to be made, or at least, for determining exactly the error of its going. The next observation is the distance of the moon's enlightened limb from the sun or a star. The 3rd and 4th observations are the altitude of the moon and the sun, or the star from which the moon's distance is observed, to be taken by two observers assisting the person who takes the distance of the moon from the sun or a star at the very instance, or at the utmost within a minute of the time he gives notice that he has completed his observation. At the same instance, or at most within a quarter of a minute, and before the observers attempt to read off the degree and minutes from their quadrants, somebody must note the hour, minute and quarter part of a minute of the watch regulated as mentioned before. . . .

With the publication of Mayer's *Tables of the Moon* in 1753 the place of the moon's position could be found with sufficient accuracy to ensure that the error in a longitude found by the lunar method would not be much more than half a

degree. The lunar problem could at last be solved by the navigator provided he had an adequate instrument; one was available. Hadley's sextant allowed precise observations to be made.

Maskelyne wrote in the preface to his *British Mariner's Guide,*

> Daily experience shows the wide uncertainty of a ship's place, as inferred from the common methods of keeping a reckoning, even in the hands of the ablest and most careful navigator. Five, ten or even fifteen degrees are errors which no one can be sure he may not fall into in the course of long voyages.

It was James Cook who on his first long voyage (1768–71) applied the lunar method of ascertaining longitudes with unprecedentedly accurate results; he had been instructed by Maskelyne's assistant, Charles Green. On his second great voyage (1772–75) Cook had a duplicate of Harrison's chronometer and secured even better results.

Progress in navigation during the nineteenth century lay in improving methods of dead reckoning, while the present century has seen an even greater degree of precision in position finding as a result of the development of radio aids to navigators.

[1] John Dee, *Preface to the English Euclid,* 1570.
[2] Daniel Newhouse, *The Whole Art of Navigation,* 1707.
[3] John Harris, *Lexicon Technicum,* 1704.
[4] Carl V. Solver, 'The Egyptian Obelisk,' *Mariner's Mirror,* 26, 1940, pp. 237-256.
[5] E. G. R. Taylor, 'The Navigator in Antiquity,' *Journal of the Institute of Navigation,* 1, 1948.
[6] Masudi claimed to have seen copies of the maps of Marinus of Tyre. See A. E. Nordenskiöld, *Periplus,* 1897.
[7] Raymond Lull, *Arbor Scientiæ,* 1295. Folio ccxi, Lyons edition, 1515, British Museum.
[8] A sketch of the coastline from the mouth of the River Maas to Acre in Palestine found in the *Ecclesiastica Historia* of Adam of Bremen.
[9] The simple type was used by Vasco da Gama. It was not easy to take an altitude with an astrolabe on the deck of a fifteenth-century ship and the operation seems to have required three men, one to hold the instrument, another to align it, and a third to read it.

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ABBREVIATIONS: B.M., British Museum; R.G.S., Royal Geographical Society.

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